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THE NORTH AMERICAN SPECIES OF ANCISTROCERUS, PROPER (HYMENOPTERA, VESIPDAE)

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Introduction

During the years elapsed since the publication of my paper on the North American *Ancistrocerus* (Trans. Amer. Ent. Soc., LI, pp. 57–117, 1925), much additional material has been studied by myself, as well as by my friend, Dr. R. M. Bohart. It was possible to reach some fairly definite conclusions regarding the identity of most of the names proposed by Peter Cameron, which led to the clarification of the western species of the genus. Dr. Bohart and I originally intended writing the present revision jointly; but various circumstances have made this plan impractical.

The present account is supplemental to the 1925 paper, which should be consulted for more detailed synonymy and locality records. Moreover, only *Ancistrocerus* in the restricted sense is covered here. *Parancistrocerus* is closely allied with *Stenodynerus* and, as stated before, it was formerly treated with *Ancistrocerus* as a matter of convenience only. *Pseudodynerus,* now considered generically distinct, was discussed in a separate paper (Amer. Mus. Novit., No. 1106, pp. 1–10, 1941). A Texan species, with a transverse suture on tergite 1, belongs to a new genus, more commonly found in the Neotropical Region, and will be described elsewhere.

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[1] From the Museum of Comparative Zoölogy, Cambridge, Mass.

The distribution is given chiefly by states and provinces; but, if no definite locality for a state was published in 1925, one at least is now included. Otherwise, I have not usually listed all localities from where I have seen specimens, except in the case of new forms or toward the limits of the range.

The dates of Henri de Saussure's names have been corrected to agree with F. J. Griffin's recent findings (Journ. Soc. Bibl. Nat. Hist., I, pp. 211–212, 1939). The emended names *waldenii* (not *waldonii*), *catskillensis* (not *catskill*), *tuberculiceps* (not *tuberculocephalus*) and *parredesi* (not *parredes*) have been adopted, as they are corrections made *in print* by the authors of these names, either formally (for *waldenii, catskillensis* and *tuberculiceps*) or by inference (for *parredesi*).

In the 1925 paper I mentioned types of Cameron's species supposedly in the collections of Pomona College, at Claremont, California. Dr. Bohart and I have obtained evidence making it extremely doubtful that these specimens were ever seen by Cameron or used by him when he drew up his descriptions. They are probably no more than specimens originally retained by C. F. Baker as supposedly identical with others he sent to Cameron and provided with corresponding numbers. Dr. Bohart tells me that the labels now on the specimens are in Cook's handwriting. It is not surprising then that the Pomona College specimens in some cases differ markedly from Cameron's published descriptions. I know from personal experience that Cameron often failed to return material sent to him for study, and, in this case, Baker may have allowed him to retain it. Most of Cameron's collection, it is well known, was acquired by the British Museum after his death; but few if any of the types of the species sent by C. F. Baker reached that Museum. In some mysterious way some of them, at any rate, recently turned up on the European continent in the collection of a Swiss entomologist. These specimens, I feel certain, are Cameron's true types and they will alone be binding for fixing the identity of his names. Several months ago, I sent a series of named North American wasps to Mr. A. G. Soika, at Venice, who had kindly offered to compare them with these Cameron types. Thus far only a few of the *Ancistrocerus* were recognized by him. The other synonymy of Cameron's names given in this paper must be regarded as tentative.

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General Characteristics

Several species of *Ancistrocerus* are among our most common solitary wasps. The genus is one of five groups of North American odyneroid wasps[3] possessing a transverse carina across the summit of the first abdominal tergite. The other four genera with this peculiarity are *Symmorphus, Pseudodynerus, Stenodynerus* (subgenus *Parancistrocerus* only), and a new genus to be described elsewhere. Among these, *Ancistrocerus,* proper, may be recognized by the following sum of characters.

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[2] The abbreviations added in parenthesis have been used in the body of the paper.

[3] The term ''odyneroid wasps'' might conveniently be used for a group of genera thus far usually treated as subgenera of *Odynerus,* and characterized principally by the non-petiolate abdomen, simple four-segmented labial palpi and six-segmented maxillary palpi. They merge gradually into the stalked eumenoid type, so that they can scarcely form a subfamily Odynerinae or a tribe Odynerini, as some authors have claimed.

First tergite without a longitudinal groove posterior to the transverse carina (present in *Symmorphus*). Antehumeral slope (or saddle) of pronotum without pits (present in *Parancistrocerus*). Propodeum without a shelf-like extension on a level with the postscutellum (present in *Pseudodynerus*). Mesopleuron without prepectal (or epicnemial) ridge (present in *Symmorphus* and *Parancistrocerus*). Vertex of female with two minute hairy pits. Antenna of male with segment 12 very short, segment 13 slender and hook-like (folded beneath 11) (antenna simple in male *Symmorphus*). No species is known to have an acarodomatium at the base of the second abdominal tergite, which instead bears a transverse row of large or small foveae. In all North American species the mandibles are normal in both sexes.

Ancistrocerus is unusual among the Vespidae in that the specific characters are better defined in the female than in the male, while in most other genera the reverse is true. There is a great dearth of secondary sexual characters. The male terminalia are in most cases extremely similar and of little value in the discrimination of species. One notable exception is *A. antilope* (= *capra*), in which the aedeagus is strikingly different.

So far as I can make out from Blüthgen's complicated key (Deutsch. Ent. Zeitschr., p. 440, 1938), all North American species discussed in this paper would fall in his restricted genus *Ancistrocerus.* They can all be derived from *Rygchium*-like odyneroid ancestors, although they clearly belong to five distinct types; so that even this restricted group may have been polyphyletic in the New World.

1. *A. parredesi* stands by itself, being a Neotropical element that has crossed the Mexican border into southern Arizona. It is allied to several other Neotropical species (*A. pilosus* de Saussure, *A. flavomarginatus* Brèthes, etc.) and has no relatives in the Old World.

2. *A. tuberculiceps, A. unifasciatus, A. campestris* and *A. lineativentris* have the deep furrow of the second sternite characteristic of many North American *Rygchium.* The group appears to be essentially Nearctic, although it extends into the highlands of Mexico. It seems to have no true representatives in the Old World.

3. *A. antilope* (= *capra*) and *A. spinolae* are isolated in the genus and belong to a Holarctic type. *A. antilope* is one of the few well-established cases among the Hymenoptera of a species remain-

ing structurally identical throughout the Palearctic and Nearctic Regions. There is no reason to suspect, in this case, that it might have been introduced from Europe by the agency of man. The fact that it has produced three color races peculiar to North America seems to be conclusive proof that it is autochthonous there.

4. *A. birenimaculatus, A. waldenii* and *A. spilogaster* form a compact group of stubby, broad-bodied species, with a rather deeply emarginate clypeus in the male. Their nearest relative in the Old World appears to be *A. oviventris* (Wesmael), although this has the thorax much less stubby than the three North American species.

5. The remaining species are very similar to those of the Palearctic Region, where they are represented by closely allied or perhaps identical forms. (*A. parietum,* a recent introduction by man, is left out of this discussion.) Thus *A. catskillensis* seems to be the American representative of *A. parietinus* (Linné); *A. tigris* that of *A. trifasciatus* (O. F. Müller, 1776) (= *trifasciatus* Fabricius, 1787) and *A. neocallosus* that of *A. nigricornis* (Curtis, 1826) (= *callosus* C. G. Thomson, 1870).[4]

VARIATION IN STRUCTURE AND COLOR

As in my other work on the Vespidae, the species of *Ancistrocerus* are here separated solely on the basis of differences in structure judged to be sufficiently constant for recognition in extensive series and over a wide area. Such structural species are few, not more than fifteen being recognized for America north of Mexico (one of them introduced by man). The method of defining vespid species by structure alone, with complete disregard of shade and pattern of color, was introduced some years ago as the most reliable for purposes of classification, quite aside from theoretical considerations. Nevertheless, it is my opinion, as expressed on previous occasions, that structure is linked up more rigidly than color with the genetic constitution of the individual. More in particular, structural characters are believed to be less subject to variation under the direct influence of the environment during the development or ontogeny of the individual.

Although I use structural differences as the only specific criteria in wasps, I am fully aware that such characters also exhibit intraspecific variation. Mainly for this reason, a rational taxonomy of the Vespidae should be based on a study of large series of individuals covering as much as possible of the geographical area of the several species. A species is not properly understood until the range of variation of all its structural characters is known. For each character we may regard as the norm the condition present in the majority of the individuals of the species, hence the condition most likely to be found in an individual picked at random, as, for instance, in general field collecting. When several individuals of a species are compared, deviations in different directions from the norm are usually observed, even though some of the specimens may be the offspring of the same female. Such fluctuating variation of a character has definite upper and lower intraspecific limits. It is the business of a rational taxonomy to establish these limits, so that unusual specimens may be referred to their correct taxonomic unit.[5]

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[4] The nomenclature of the Palearctic species of *Ancistrocerus* is in a great deal of confusion. The specific names here used are those of Blüthgen's list (Konowia, XVI (1937), pp. 282–285, 1938).

Several of the North American species of *Ancistrocerus* are best defined by the proportions of the thorax and of the first abdominal segment, particularly in the females. These differences are usually much less marked in the males, which show a general tendency to shorten the thorax. Some species are set off from the others by the presence of a deep longitudinal furrow on the base of sternite 2; but it should be noted that a trace of this furrow is sometimes found in some forms of *A. catskillensis*. The shape of the clypeus and of its apical emargination or notch is often variable in the same species, particularly in the male, as well illustrated by *A. catskillensis* (Figs. 2D,F,G). Yet it affords some of the most useful specific characters in the genus. The shape of the humeral angles of the pronotum is even more variable and rather difficult to describe, so that this character should be used with the utmost caution. Unusual characters are often prone to vary within wide limits, as shown by the variable development of the shiny postocellar tubercle of *A. tuberculiceps*.

A special problem is presented by variations in structure which tend to reach beyond the limits of intraspecific fluctuation. Two such cases are known among North American *Ancistrocerus*. The first is *A. antilope* var. *navajo*, a form which I originally gave full specific rank. It is, however, clearly no more than a modified *A. antilope*, differing from the other color forms of the species, not only in the orange tinge of the extensive yellow markings, but also in the coarsely punctate preäpical areas of most of the tergites (particularly the second). *A. catskillensis* var. *durangoensis* is even more aberrant; for, not only are the preäpical areas of the tergites more coarsely punctate than in the other forms of the species, but the apical edges of tergites 2 and 3 are more or less thickened or raised, in extreme individuals even forming low collars. However, all transitions connect such extremes with normal typical *catskillensis*, so that some specimens must be placed arbitrarily. It would seem, therefore, that in both *navajo* and *durangoensis*, certain genetic changes are involved, so that these forms possibly represent beginning species or true ''subspecies,'' if the latter category be restricted to the incipient stages of species.

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[5] It is not the proper place here to discuss the possible causes of intraspecific fluctuating variation, which are no doubt of great complexity. While they are certainly to some extent of a genetic or intrinsic nature, the influence of the environment cannot be ruled out even for the structural characters. In *Ancistrocerus,* for instance, the size of most species varies greatly, depending no doubt to some extent upon nutritional conditions in the larval stages. Now it may be observed that structural variations are often correlated with size, medium-sized individuals as a rule exhibiting the norm, while dwarfs and giants tend to deviate.

The many intraspecific variations in shade and pattern of color of the Vespidae are, in my opinion, of a different order and have scarcely the value of incipient species. In their case, it is by no means obvious nor necessary to assume that genetic changes are involved. These color variations may be due directly to environmental factors, possibly acting during the ontogeny of the individual. At any rate, they seem to be closely linked with climatic conditions, which may be the main causal influences. A careful study of these variations is of great theoretical interest, as well as of practical value for taxonomic purposes. In the present paper an attempt has been made for the first time to subordinate the many color variants of the North American *Ancistrocerus* to their respective structural species. Most of these forms were described and listed thus far as distinct species.

If the conclusions here presented agree with the facts, the color variations of *Ancistrocerus* in North America follow the familiar Vespid pattern of homeochromy and heterochromy. Each heterochromic structural species runs through a gamut of color shades and patterns which are closely paralleled by similar variants of one or more of the other species. Several groups of homeochromic forms thus emerge, each group as a rule more or less characteristic for a certain geographical area, although there is usually much overlapping or simultaneous occurrence of two or more of the homeochromic groups. This suggests a possible correlation between the dominant homeochromic group of a given district and some of the

Color Patterns of *Ancistrocerus* in North America

1. Black-and-yellow	2. Xanthic	3. Black-and-white	4. Harlequin	5. Black-and-red
....	*birenimaculatus*	....	....	....
w. excavatus	*w. flavidulus*	*waldenii*	....	....
....	*spilogaster*	....	....	....
catskillensis	{*c. halophilus* {*c. durangoensis*	*c. albophaleratus*	....	....
tigris	*t. cytainus*	*t. albolacteus*	....	....
neocallosus	*n. discopictus*	....	....	....
paracallosus	....	....	....	....
antilope	{*a. allegrus* {*a. navajo*	*a. spenceri*	....	....
spinolae	....	....	....	....
campestris	....	....	....	....
l. kamloopsensis	*lineativentris*	....	*l. fulvicarpus*	....
unifasciatus	....	....	....	*u. seminole*
....	*t. sutterianus*	....	*tuberculiceps*	....

prevailing ecological conditions. I shall endeavor to point out that certain climatic factors, particularly sunshine, temperature and humidity, appear to be of outstanding importance in this connection.

Five readily recognizable homeochromic types have representatives among the North American *Ancistrocerus* proper, as shown in the accompanying table (p. 232).[6] It should be noted that each of the named color forms is subject to individual variation, transitions among the several forms of one structural species being by no means rare. On the other hand, the same color pattern is seldom exactly duplicated by the several species, which develop their own versions of each pattern.

1. The usual black-and-yellow Vespid pattern.—The pale markings are bright or sulphur-yellow on a black background, moderately developed and restricted on the abdomen to the apical margins of some or of most segments. This is the dominant pattern among the Vespidae of temperate North America, Europe and Asia. As *Ancistrocerus* proper is almost exclusively a Holarctic group, one is perhaps justified in regarding this color pattern as primitive in the genus, the other patterns described below having been derived from it at a later date. This conclusion seems further supported by the fact that, of the several color patterns of a given species, this one often has the widest geographical distribution, its range frequently covering part of that of the other forms. It predominates where temperate climatic conditions prevail: winters are rather mild and short; even the summer temperature does not average very high; there is a moderate amount of sunshine during the summer; and the rainfall is ample and fairly evenly distributed over the year, particularly over the warmer months. As shown in the table, 10 out of the 13 Nearctic species are represented by this pattern. *A. unifasciatus* is an aberrant member of the group, as the yellow markings (particularly the abdominal fasciae) tend to disappear, often only the fascia of tergite 1 remaining, while the wings become purplish-black. It foreshadows a melanistic, or wholly black, pattern, which is unknown in the Nearctic Region, but has representatives elsewhere in *Ancistrocerus* and other Vespidae.

2. The xanthic pattern.—The bright or sulphur-yellow markings spread over the otherwise black background, usually beginning with the appearance of a pair of discal spots on tergite 2, a widening of the apical fasciae and an extension of the spots on head and thorax. The discal spots, which may also show on other tergites and sternites,

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[6] *A. parredesi,* which is a straggler from the Neotropical Region, and the introduced *A. parietum* are not considered in this discussion.

eventually fuse with the apical fascia and, in extreme cases, the abdomen is almost entirely yellow. The wings often are tinged with honey-yellow, while the yellow of the body may be suffused with orange or reddish at the limits between the yellow and black areas. This pattern occurs mostly over the Western third of North America, and is particularly characteristic of the Pacific states. The one exception to this rule is *A. birenimaculatus,* a wasp of the mid-Eastern states, which is perhaps a relatively recent immigrant into this area from farther west. It should, however, be mentioned that several other Eumeninae have discal spots on the abdomen in the eastern United States, even as far north as New England. Otherwise, this pattern is usually associated with a fairly even climate, without great extremes of temperature, but rather drier than average and with plenty of sunshine during most of the year. Of the 13 Nearctic species, 9 have developed more or less xanthic forms, but *A. t.* var. *sutterianus* is the most striking of them all.

3. The black-and-white pattern.—The ground color is black and the pale markings are pure white to creamy-white. They are often much reduced or partly lacking, particularly the apical fasciae of the abdomen. The wings are frequently tinged with russet, especially along the costa. This type of coloration is decidedly boreal, reaching farthest North of any of the forms of the several species (up to 65° N. in the case of *A. c.* var. *albophaleratus* and 63° N. in the case of typical *A. waldenii*). Although in the more southern part of their ranges these black-and-white forms may occur together with the black-and-yellow forms of the same species, they are often restricted there to higher altitudes. On the whole this pattern is characteristic of boreal or semi-boreal conditions, that is, long and severe winters, cool and often cloudy summers, little sunshine even during the summer, and abundant atmospheric moisture either as rain or as mist. Only 4 of the 13 Nearctic species have produced this pattern, these being all structural species with the largest East to West and North to South distribution, hence exposed to a wide range of environmental conditions.

4. The harlequin or yellow-red-and-black pattern.—The pale markings are bright yellow or orange-yellow on a predominantly russet or ferruginous-red background, the black ground color being much reduced or sometimes almost lacking. It is the characteristic pattern for the Vespidae of the arid and semi-arid Southwest and even more so of northern and central Mexico. These areas have very mild or warm winters, very hot and dry summers, and superabundant sunshine all year round. The harlequin pattern is, however,

rare in *Ancistrocerus,* possibly because the genus is on the whole a type of the temperate northern parts of the Earth, few species reaching the more southern hot and dry belts. Only 2 of the 13 Nearctic species have developed forms with the harlequin pattern.

5. The black-and-red pattern.—The usual yellow markings are much reduced or disappear, being replaced by rather extensive orange-red, ferruginous or brick-red areas on a black background, while the wings are more or less purplish-black. In particular, most of segment 1 of the abdomen is reddish (with or without narrow yellow apical fascia) and there are often reddish discal spots on tergite 2. This peculiar type of coloration is found in many of the Vespidae (and other Hymenoptera) of the southeastern United States, particularly Florida and the adjoining parts of Georgia and Alabama (exceptionally elsewhere). The climate of this area may be called warm temperate: mild or warm in the winter, with much sunshine throughout the year and a fairly evenly distributed rainfall, and hot and damp during the summer (owing to its location between the Atlantic and the Gulf of Mexico). As in the case of the foregoing group and probably for the same reason, this pattern is very rare among Nearctic *Ancistrocerus,* only one of the species representing it (*A. u.* var. *seminole*).

Trivial Names Discussed, with Their Equivalents

(New names in **bold-face**, synonyms in *italics*)

adiabatus, Odynerus = ? A. tigris.
albolacteus, A. tigris var. (or subsp.).
albophaleratus, Odynerus = A. catskillensis var. albophaleratus.
allegrus, A. antilope var. (or subsp.).
antilope, Vespa = A. antilope.
behrensi, Ancistrocerus = A. catskillensis var. durangoensis.
birenimaculatus, Odynerus = A. birenimaculatus.
campestris, Odynerus = A. campestris.
canadaensis, Odynerus = A. tigris.
capra, Odynerus = A. antilope.
catskill, Odynerus = A. catskillensis.
catskillensis, Odynerus = A. catskillensis.
catskilli, Odynerus = A. catskillensis.
cervus, Odynerus = A. tigris.
cytainus, Odynerus = A. tigris var. cytainus.
daedalus, Odynerus = A. catskillensis.
daedaleus, Odynerus = A. catskillensis.

discopictus, A. neocallosus var. (or subsp.).
durangoensis, Ancistrocerus = A. catskillensis var. durangoensis.
edwardsii, Odynerus = ? Ancistrocerus.
excavatus, A. waldenii var. (or subsp.).
flavidulus, A. waldenii var. (or subsp.).
fulvicarpus, Ancistrocerus = A. lineativentris var. fulvicarpus.
fulvitarsis, Ancistrocerus = A. catskillensis var. halophilus.
gunnisonensis, Ancistrocerus = A. catskillensis.
gunnistonensis, Ancistrocerus = A. catskillensis.
halophila, Ancistrocerus = A. catskillensis var. halophilus.
howardi, Ancistrocerus = A. tigris.
kamloopsensis, A. lineativentris var. (or subsp.).
lecontei, Ancistrocerus = A. antilope.
lineativentris, Ancistrocerus = A. lineativentris.
monteregalis, Odynerus = A. tigris.
navajo, Ancistrocerus = A. antilope var. navajo.
nearcticus, Ancistrocerus = A. antilope.
neocallosus, Ancistrocerus.
nigrohirsutulus, Odynerus = A. tuberculiceps.
ormsbyensis, Ancistrocerus = ? A. catskillensis.
paracallosus, Ancistrocerus.
parietum, Vespa = A. parietum.
parredes, Odynerus = A. parredesi.
parredesi, Ancistrocerus = A. parredesi.
pertinax, Odynerus = ? A. tigris.
quebecensis, Ancistrocerus = A. tigris.
rivularis, Ancistrocerus = ? Ancistrocerus.
seminole, A. unifasciatus var. (or subsp.).
sexcingulatus, Ancistrocerus = A. catskillensis.
simulator, Ancistrocerus = ? Ancistrocerus.
spenceri, A. antilope var. (or subsp.).
spilogaster, Ancistrocerus = A. spilogaster.
spinolae, Odynerus = A. spinolae.
sutteranus, Ancistrocerus = A. tuberculiceps var. sutterianus.
sutterianus, Ancistrocerus = A. tuberculiceps var. sutterianus.
tahoensis, Ancistrocerus = A. catskillensis var. halophilus.
tardinotus, Ancistrocerus = A. parietum.
tenuatus, Ancistrocerus = A. tigris.
tigris, Odynerus = A. tigris.
trichionotus, Ancistrocerus = A. catskillensis.
tuberculiceps, Odynerus = A. tuberculiceps.
tuberculocephalus, Odynerus = A. tuberculiceps.

uncinatus, Odynerus = A. unifasciatus.
unifasciatus, Odynerus = A. unifasciatus.
waldenii, Odynerus = A. waldenii.
waldonii, Odynerus = A. waldenii.

There is a possibility that some other North American wasps described by P. Cameron, either as *Odynerus* or *Ancistrocerus,* should be placed in *Ancistrocerus* proper. This can, however, not be decided unless the true types can be examined.

Ancistrocerus (?) *nigro-hirsutus* Cameron (1908), as represented in the Pomona College Collection, is a mixture; but these specimens were probably never seen by Cameron. R. M. Bohart (Pan-Pacific Entom., XV, p. 79, 1939) synonymizes *A. nigro-hirsutus* with *Odynerus* (*Rygchium*) *morelios* de Saussure (1857); whether or not this is correct will have to be decided by a study of the true type.

Key to Nearctic Species

1. Second sternite with a deep, median, longitudinal furrow at base. Propodeum with lateral angles rounded off, either without ridges or with only the superior ridge. Tergite 2 more roughly punctate near hind margin, which is more or less raised or collar-like .... 2.
   Second sternite without deep, median, longitudinal furrow; if with a trace of furrow, propodeum with distinct lateral angles and its concavity mostly or entirely enclosed by ridges .... 5.
2. Vertex behind ocelli with a distinct shiny tubercle, occupying one-third or more of the space between hind ocelli (more developed in male than in female). Humeral margin of pronotum with a fine carina, interrupted medially .... *A. tuberculiceps.* Ss p. 283
   Vertex without shiny tubercle, at most with a smooth, slightly raised, flat area in male .... 3.
3. Humeral margin of pronotum with a fine carina, interrupted medially. Propodeum with an incomplete superior ridge. Vertex of male with the median area nearly smooth and slightly raised, flat .... *A. unifasciatus.* Ss. p 281
   Humeral margin of pronotum without carina. Vertex of male with the median area not raised, coarsely punctate .... 4.
4. Humeral angles of pronotum weak; humeral margin nearly straight. Propodeum without superior ridge.
   A. campestris. Ss. p. 278

Humeral angles of pronotum prominent, slanting forward (especially in male); humeral margin somewhat incurved. Propodeum with incomplete superior ridge. *A. lineativentris.*

5. Inferior ridge of propodeal concavity very prominent, about as high as diameter of median ocellus. Thorax very long; notaulices of mesonotum strongly marked. Male: apex of sternite 7 about as wide as clypeus at base; antennal hook short, not or scarcely longer than segment 12 .... 6.

Inferior ridge of propodeum not as high as diameter of median ocellus, sometimes absent; its sides and concavity dull, shagreened, punctate or striolate. Male: apex of sternite 7 less than width of clypeus at base .... 7.

6. Lower portion of latero-ventral area and most of concavity of propodeum smooth and shiny, not shagreened, almost impunctate .... *A. antilope.* p27

Latero-ventral areas and concavity of propodeum dull, shagreened, roughly punctate and striolate .... *A. spinolae.*

7. Base of sternite 2 in profile without convexity, either flat or slightly depressed .... *A. parietum.* Part. p27

Base of sternite 2 in profile more or less convex, or strongly swollen, or vertically sloping .... 8.

8. Inferior ridge of propodeum barely indicated or absent. Upper half of outer orbit (near vertex) with very few large punctures. Sternite 2 vertically sloping at base. Preäpical area of tergite 2 more or less depressed, strongly punctate; its margin somewhat upturned in male. Clypeus of male hardly incised at apex. Body with dense, short, silky pubescence, as well as long, erect hairs .... *A. parredesi.*

Inferior ridge of propodeum distinct, sharp. Outer orbit uniformly punctate throughout. Clypeus of male more or less incised at apex. Body without conspicuous, short, silky pubescence .... 9.

9. Base of sternite 2 strongly swollen, angular in profile, vertically sloping toward articulation with first .... 10.

Base of sternite 2 moderately and evenly convex, gently sloping toward articulation with first .... 11.

10. Apical margins of tergites 2 and 3 strongly raised, upturned, collar-shaped. Thorax elongate; scutellum and postscutellum flattened in female .... *A. paracallosus.*

Apical margins of tergites 2 and 3 not raised nor collar-shaped, at most slightly thickened. Thorax short and stubby; scutellum and postscutellum convex in female. *A. neocallosus.*

11. Hind part of mesonotum and entire scutellum conspicuously flattened (more in female than in male). Body very slender. Thorax from above about one and two-thirds times as long as wide at humeral margin; mesonotum slightly longer than wide; propodeum narrower than pronotum. Clypeus of male slightly emarginate at apex .... *A. tigris.*

Mesonotum and scutellum more or less convex throughout, not flat. Mesonotum at most as long as wide .... 12.

12. Humeral margin of pronotum with a fine carina or transverse welt, barely interrupted medially; both sexes without projecting humeral angles; concavity of propodeum completely enclosed by ridges. Clypeus weakly sculptured in both sexes, wider than long in female, deeply but broadly emarginate at apex in male. Upper outer orbit of male narrower than eye in profile. Body short and stubby; thorax from above at most one and one-half times as long as wide at humeral margin; in female wider than head, with mesonotum slightly wider than long. Pubescence sparse, short, particularly on clypeus .... *A. birenimaculatus.* Ss. p 240

Humeral margin of pronotum usually completely rounded off; if with traces of carina, superior ridges of propodeum incomplete or obsolete, or humeral angles prominent. Pubescence usually long and abundant, particularly on clypeus .... 13.

13. Body very stubby, particularly in female; thorax from above at most one and one-half times as long as greatest width; mesonotum of female slightly wider than long; postsutural area of tergite 1 at least two and one-half times as wide at suture as long in the middle. Superior ridge of propodeum often incomplete or obsolete. Clypeus of female wider than long; that of male usually wider than long, moderately to deeply emarginate .... 14.

Body less stubby; thorax from above about one and two-thirds times as long as greatest width; mesonotum of female about as long as wide; postsutural area of tergite 1 not

or scarcely over twice as wide at suture as long in the middle. Concavity of propodeum completely enclosed by a rim; superior ridge well developed. Humeral angles weak or moderately projecting. Clypeus of female about as long as wide; that of male at least as long as wide, shallowly to moderately emarginate.
A. catskillensis.

14. Upper part of outer orbit wide, particularly in male (eye little bulging in profile). Postscutellum swollen, with a rather long horizontal area, divided by a median depression; humeral angles rather narrow, moderately projecting (slightly more in male than in female). Clypeus of male with deep, narrow emargination.
A. waldenii.

Upper part of outer orbit narrow, particularly in male (eye strongly bulging in profile). Postscutellum little raised, flattened from behind, with a very short horizontal area, without median depression; humeral angles rather wide, usually strongly projecting and often slanting forward in male. Clypeus of male less deeply, more broadly emarginate. .... *A. spilogaster.*

1. *Ancistrocerus birenimaculatus* (de Saussure).
Odynerus (*Ancistrocerus*) *birenimaculatus* H. de Saussure, Et. Fam. Vesp., I, p. 135, 1853 (♀; Carolina).

Range.—*A. birenimaculatus* is widely distributed in the eastern United States, where the characteristic mud-nests are frequently found, although adults are rarely taken in the open. I have seen specimens from Maine (Brunswick), Massachusetts (Berlin; Reading; Bourne; Wayland; Amherst), Rhode Island (Providence; Westerly), Connecticut (Redding), New York (Buffalo), New Jersey, Pennsylvania, Maryland (Suitland), the District of Columbia, Virginia (Dismal Swamp), North Carolina, South Carolina (Aiken), Georgia (Atlanta), Texas, Indiana and Wisconsin (Milwaukee).

Structural Characters and Affinities.—*A. birenimaculatus* is well differentiated from its near relatives, *A. waldenii* and *A. spilogaster,* as shown in the key. The relatively long and thick segment 13 (or hook) of the ♂ antenna is an additional character not mentioned there.

Color Pattern and Variation.—This is the only *Ancistrocerus* of the eastern United States normally with yellow discal spots on the sides of tergite 2, in addition to the yellow apical fascia; but in some ♂ these spots are very small or even wanting, although other ♂ bred from the same nest show them. The pale markings are always yellow. Tergite 6 usually has a spot in the ♀. In northern specimens the clypeus of the ♀ sometimes bears a median black stripe the length of the upper half, connected with the black upper margin. Southern specimens are often more extensively yellow. A ♀ from Texas has the postsutural area of tergite 1 yellow with an anterior hourglass-shaped black spot and the discal spots of tergite 2 very large, connected on the sides with the apical fascia.

Habits.—The following information is additional to that given in 1925. P. Rau described and figured a nest from Flushing, New York (Bull. Brooklyn Ent. Soc., XXX, p. 112, fig. 1, 1935). The nest "on *Juniperus,*" from which A. B. Champlain bred the ichneumonid parasite, *Acroricnus junceus* (Cresson), at Conewago, Pennsylvania (Psyche, XXIX, p. 99, 1922), was most probably that of *A. birenimaculatus.* Stylopized specimens were reported by G. Salt (Psyche, XXXIV, p. 184, 1927) and G. Salt and J. Bequaert (Psyche, XXXVI, p. 259, 1929). P. W. Fattig bred a ♀ mutillid wasp, *Pseudomethoca frigida* (Smith), from a nest of *A. birenimaculatus* found at Atlanta, Georgia (Emory Univ. Mus. Bull. No. 1, p. 4, 1943).

2. *Ancistrocerus waldenii* (Viereck).

Range.—*A. waldenii* occurs throughout the northern and central United States and southern Canada. The southern limit seems to run from northern California and northern New Mexico to Virginia. Northward it extends to southern Labrador and central Alaska (Mt. McKinley Nat. Pk., 63° N.), this being one of two solitary vespids ranging the farthest north in the New World.

Structural Characters and Affinities.—*A. waldenii* and *A. spilogaster* are very close, as shown under the latter. I consider them specifically distinct on the authority of Dr. R. M. Bohart, who has pointed out to me that they differ in habits as well as in certain structures. The Palearctic *A. oviventris* (Wesmael) is structurally like *A. waldenii,* but its thorax is less stubby; its color pattern is that of the American var. *excavatus.*

Color Pattern and Variation.—*A. waldenii* varies much in color, three forms being recognized in this paper. The typical form, occupying the major part of the range of the species, has white or creamy-white markings; the other two forms, restricted to some of the Rocky Mountain and Pacific States, have them yellow.

1. Body markings white or creamy-white; tergite 2 without lateral discal spots; wings grayish .... typical *waldenii*.
   Body markings yellow .... 2.
2. Yellow markings moderately developed; tergite 2 with apical fascia only; wings grayish .... var. *excavatus*.

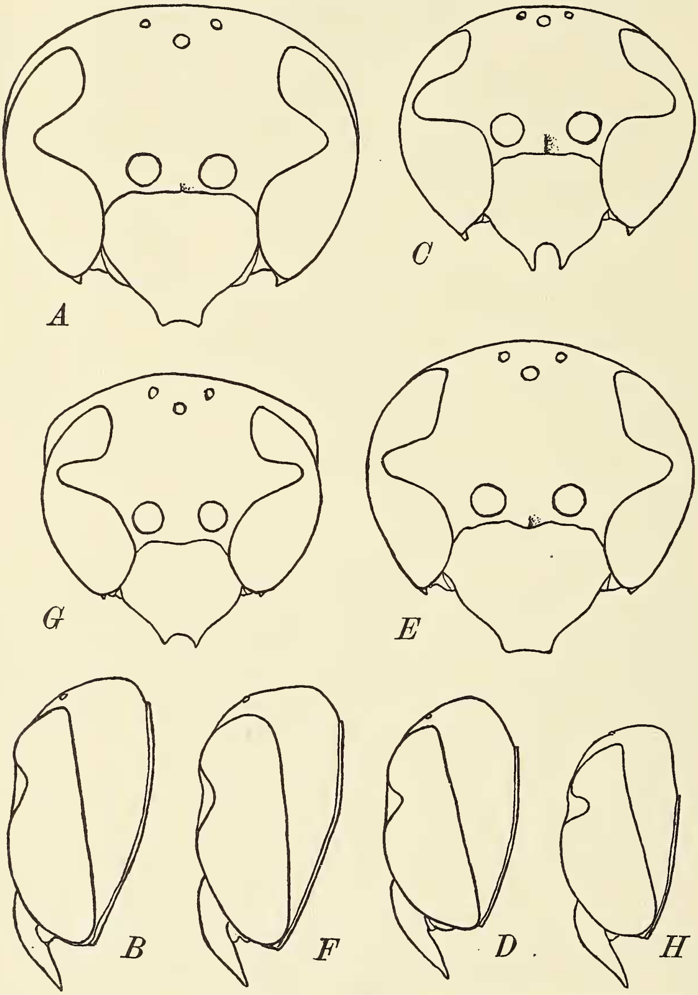

Fig. 1. A–D, *Ancistrocerus waldenii* (Viereck), typical: A, head ♀ in front view, Reading, Mass.; B, same in profile; C, head ♂ in front view, Tamworth, N. H.; D, same in profile.—E–H, *Ancistrocerus spilogaster* Cameron: E, head ♀ in front view, Antioch, Calif.; F, same in profile; G, head ♂ in front view, Herkey Creek, Calif.; H, same in profile.

Yellow markings more extensive; tergite 2 with discal spots more or less connected on the sides with the apical fascia; wings suffused with amber-yellow .... var. *flavidulus*.

Habits.—Typical *waldenii* and its two varieties are known to build free mud-nests attached to a wall or a rock. It may be noted that the Palearctic *A. oviventris* has similar nesting habits.

2*a*. Typical *A. waldenii*. Figs. 1A–D.

Odynerus (*Ancistrocerus*) *waldonii* Viereck, Ent. News, XVII, p. 304, 1906 (♀; New Haven, Connecticut).

Odynerus (*Ancistrocerus*) *waldenii* Viereck, Ent. News, XVII, p. 350, 1906 (author's emendation).

Range.—Although never a common wasp, typical *A. waldenii* covers a wide area across the American continent. I have seen it from Labrador (Mud Lake), Newfoundland, Quebec (Montreal; Rigaud), Ontario (Waubamic), Nova Scotia (Baddeck, Cape Breton Id.; Greenfield, Queens Co.), Maine (Orono; Brooksville), New Hampshire (Durham, Spruce Hole; Tamworth; Alstead), Vermont, Massachusetts, Connecticut (Lyme; Colebrook), New York (Garrison; Hartsdale), New Jersey, Pennsylvania (Milton), Maryland, Virginia (Dismal Swamp), Illinois (Savanna), Michigan (Isle Royale), Minnesota (Pine City), Colorado (Tennessee Pass, 10,240 ft.; Malta, Lake Co., 10,000 ft.; Ward, Boulder Co., 10,500 ft.; Nederland, Boulder Co., 10,000 ft.; Silverton, 12,000 ft.), South Dakota (Custer; Buffalo Valley, Stanley Co.), New Mexico (Little Tesuque Canyon near Santa Fé, 9,200 ft.), Montana (St. Mary's; Weeksville), Wyoming (Big Horn Mts.; Jackson, 6,300 ft.), Idaho (Warren), Manitoba (Le Pas near Winnipeg; Cedar Lake), Alberta (Medicine Hat; Wabamun; Banff; Manyberries; Nordegg; Jasper; Clymont), British Columbia (Kaslo; Kamloops; Rogers Pass, 4,500 ft.; Ground Hog Basin, Big Bend Country, Selkirk Mts.), and Alaska (Mt. McKinley National Park). There is also a reliable published record from Wisconsin. Additional specimens were seen recently from New Brunswick (St. John; Fredericton), Saskatchewan (Melfort) and the North West Territories (Ft. Rae, Great Slave Lake, 62° 30′ N.).

Color Pattern and Variation.—Typical *waldenii* is fairly constant in color, specimens from Alaska and Labrador being like those from farther south. In British Columbia the white is often more creamy, passing to the yellow of var. *excavatus*. The white spot of tergite 6 in the ♀ is rarely wanting. In the ♀ the clypeus varies from black with two white upper spots to almost completely white. The ♀ from Warren, Idaho, mentioned in 1925, was unusual in color, but a ♂ taken with it does not differ from usual males; moreover, I have seen a similar ♀ from St. Mary's, Montana.

Habits.—The only account of the habits published thus far is a brief description by P. Rau of a nest found at Devils Lake, Wisconsin (Bull. Brooklyn Ent. Soc., XXX, p. 111, 1935). I owe the following notes to Dr. Richard P. Dow, who observed two nests of typical *waldenii* in Massachusetts, the structure and location being alike in both cases. One nest was found June 4, 1934, in a crevice of a rocky ledge at Melrose. It was built of mud and very hard. Except that it was flattened on the side attached to the rock, there was not much about its construction to distinguish it from the free mud-nests of *A. birenimaculatus.* It consisted of one unfinished and 8 completed cells. One of the closed cells contained only a large wasp larva; the others held paralyzed caterpillars, more or less intact, 1 to 17 in each cell. Six of the cells also contained a wasp larva, but in the seventh (with 9 caterpillars) there was no trace of a wasp egg or larva. The unfinished cell sheltered a female wasp, presumably the builder of the entire nest, and 2 caterpillars. One male was later bred from this nest. A very similar nest was found in a crevice of a ledge at Medford, July 6, 1940. In contained 8 or 9 full-grown wasp larvae, without prey. Adults emerged from this nest in late May and early June of the next year. T. W. Harris, about a century ago, was acquainted with this wasp and its habits in New England and recognized it as a distinct species. His collection, on deposit at the M.C.Z., contains both sexes. According to the manuscript Catalogue, his male was from Saddleback Mt., Maine, while his female, collected in 1854, was said to "make a mud-nest on walls, provisioned with naked caterpillars." He gave the wasp an unpublished name meaning "banded with luteous." G. Salt and J. Bequaert listed a stylopized ♀ of typical *A. waldenii* from Montreal (Psyche, XXXVI, p. 261, 1929).

2*b*. *A. waldenii* var. (or subsp.) **excavatus**, new.

Color pattern much as in typical *waldenii,* but yellow instead of white. Tergite and sternite 2 with apical fascia only.

Female.—Black with the following markings yellow: a spot on base of mandible; two dots on clypeus; a frontal spot above antennae; a dot on upper outer orbit; broad humeral margin of pronotum; outer margin of tegula; a dot on upper mesepisternum; two transverse spots on scutellum; broad apical fascia on tergite 1 (widened forward at sides) and on tergites and sternites 2 to 5; a large spot on tergite 6; apices of femora and entire tibiae. Tip of mandible ferruginous; tarsi ferruginous and yellow. Wings slightly tinged with grayish; costa yellow. Scape black throughout or more or less yellow beneath.

Male.—Scape yellow beneath; clypeus entirely, most of mandibles and tarsi, and sometimes a spot on under side of some coxae, yellow. Mesopleuron and scutellum usually unspotted. Only 3 or 4 apical segments of antennae pale russet, flagellum otherwise black. Remainder as in ♀.

A ♀ paratype from Forest Grove, Oregon, is more extensively yellow: clypeus only with a broad median black spot over basal half; lower inner orbit with a yellow dot; scape broadly yellow beneath; postscutellum and dorsal areas of propodeum spotted; apical fasciae of abdomen very wide, that of tergite 1 produced toward the middle along the suture. Although clearly transitional to var. *flavidulus,* this ♀ has no traces of latero-discal spots on tergite 2.

Range.—British Columbia: Nanaimo Biological Station, ♂ paratype (G. J. Spencer); Departure Bay, ♀ paratype (G. J. Spencer); Newcastle Id., Nanaimo, ♀ paratype (G. J. Spencer); Snake Id., ♀ paratype (G. J. Spencer); Lytton, ♀ paratype (G. J. Spencer).—State of Washington: Anacortes, Skagit Co., ♀ holotype (W. M. Mann); North Olympic Mts., ♂ allotype (P. J. Darlington); Paradise Valley, Mt. Rainier, ♂ paratypes (C. L. Fox).—Oregon: Corvallis, Benton Co., ♂ paratype (G. Ferguson); The Dalles, Wasco Co., ♀ paratype (H. A. Scullen); Forest Grove, Washington Co., ♀ and ♂ paratypes (K. Gray and J. Schuh).—California: Eureka, Humboldt Co., ♂ paratype (E. W. Baker); Great Alpine Creek, Tahoe, Placer Co., ♂ paratype (E. P. Van Duzee).—Montana: Bozeman.—Idaho: Craters of the Moon.—Wyoming: Yellowstone Park; Evanston, Uinta Co., ♀ paratype (Collection C. V. Riley); Jackson, Teton Co., 7,000 ft., ♂ paratype. —Holotype, allotype and paratypes at M.C.Z.; paratypes also at U.S.N.M., Cal.A.S., A.M.N.H., Or.St.C., Un.B.C., and in R. M. Bohart Collection. Additional paratypes at Can. Agr. Ent. are from British Columbia; Chase, ♀ (W. B. Anderson); Royal Oak, ♀ (R. C. Treherne).

Remarks.—Dr. Bohart and I were at first inclined to use Cameron's name *ormsbyensis* for this form. Several points in the description of *ormsbyensis,* however, do not fit this wasp: yellow band at apex of tergite 1 not dilated backwards laterally (in the key

Cameron seems to have written "second" abdominal segment for "first" by oversight); apical incision of clypeus broadly rounded; flagellum of antenna reddish-brown below. Males in Baker's Collection at Pomona College, labelled *"ormsbyensis,"* agree with Cameron's description, not with *excavatus;* but they may never have been seen by the author, hence are not true types. I have not seen *excavatus* as yet from Nevada.

In British Columbia, some specimens with the structural characters of *waldenii* have the markings decidedly yellow, being true *excavatus,* while others in the same locality have them much paler, almost creamy-white, thus being transitional to typical *waldenii,* which occurs there also.

Habits.—Dr. R. M. Bohart informs me that his brother, Mr. G. E. Bohart, observed the var. *excavatus* building mud-nests against rocks in California; so that the habits are similar to those of typical *waldenii.*

2*c*. *A. waldenii* var. (or subsp.) **flavidulus,** new.

Female and Male.—Markings yellow, but more extensive than in var. *excavatus.* All apical fasciae of abdomen broad, that of tergite 1 abruptly widened laterally. Tergite 2 with a pair of disco-lateral spots, usually completely fused at the sides with the apical fascia. Sternite 2 sometimes also with disco-lateral spots. Tergite 6 of ♀ with a spot and tergite 7 of ♂ sometimes spotted. Clypeus of ♀ either entirely yellow or with 2 lateral and 1 basal black spots. Scape yellow beneath in both sexes; in ♂, flagellum black beneath, except at extreme tip which is pale russet. Wings suffused with amber-yellow. I have seen no specimens with discal spots on mesonotum.

Range.—OREGON: Corvallis, Benton Co., ♂ paratype (G. Ferguson); 10 miles west of Bend, Deschutes Co., ♀ paratype (K. Gray and J. Schuh); 12 miles east of Scio, Linn Co., ♂ paratype (H. A. Scullen).—CALIFORNIA: Berkeley, Alameda Co., ♀ holotype, ♂ allotype, and ♀ and ♂ paratypes (R. M. and G. E. Bohart; J. C. Bridwell; P. H. Baldwin); San Francisco, ♀ paratypes (J. C. Bridwell); Angel Id., Marin Co., ♀ paratype (J. C. Thompson); Blocksburg, Humboldt Co., ♂ paratype (E. W. Baker); Carrville, Trinity Co., 2,400–2,500 ft., ♀ and ♂ paratypes (G. E. Bohart); Carmel, Monterey Co., ♂ paratype (L. S. Slevin); Sausalito, Marin Co., ♂ paratype (J. C. Thompson); Bair's Ranch, Redwood Creek, Humboldt Co., ♀ paratype (H. S. Barber); Mono Lake, Mono Co., ♂ paratype (C. L. Fox); Coffee Creek, Trinity Co., ♀ paratypes (E. C. Van

Dyke; F. R. Platt).—Holotype, allotype and paratypes in R. M. Bohart Collection; paratypes also at M.C.Z., U.S.N.M., A.M.N.H., Cal.A.S., and Or.St.C.

Habits.—One ♂ of var. *flavidulus* was taken by Mr. P. H. Baldwin from a mud-nest attached to a rock, at Berkeley, California, showing that the nesting habits are the same as in the other two forms of *waldenii.*

3. *Ancistrocerus spilogaster* Cameron. Figs. 1E–H.

> *Ancistrocerus spilogaster* Cameron. Invertebrata Pacifica, I, p. 121, 1905[7] (♂; no locality, but either from southern California or Nevada).

Synonymy.—The name *spilogaster* is used for this species upon Dr. R. M. Bohart's advice. As usual, Cameron's description is vague; but the statements relating to the ''metanotum'' (=propodeum), the ''clypeus (♂) longer than its greatest width; the apex roundly incised, the incision wider than long, the sides forming sharp teeth,'' and the ''apex of pronotum transverse, the sides projecting into stout bluntly pointed teeth,'' do not fit *A. waldenii* nor *A. catskillensis.* Specimens labeled ''*spilogaster*'' in the Baker Collection at Pomona College, from Ormsby Co., Nevada, agree with the present interpretation, but were probably not seen by Cameron, hence are not true types.

Range.—*A. spilogaster* is rather widely distributed in California, but never common: Stanford University, Santa Clara Co.; Tahquitz Valley, San Jacinto Mts.; San Francisco; Great Alpine Creek, Lake Tahoe; Gilroy, Santa Clara Co.; Angel Id., Marin Co.; Siskiyou Co.; Davis, Yolo Co.; Three Rivers to Giant Forest, Tulare Co.; mountains near Claremont, Los Angeles Co.; Monterey; Antioch, Contra Costa Co.; Bass Lake, Madera Co.; Descanso, San Diego Co.; Mt. Tamalpais near San Francisco; Big Bear Lake, San Bernardino Mts.; Putah Canyon, Yo-Solano Co.; Herkey Creek, San Jacinto Mts., ♂ at flowers of *Arctostaphylos;* Idyllwild, San Jacinto Mts.; Pasadena, Los Angeles Co.; Yosemite; Angora, Lake Tahoe. I have also seen it from Oregon (Butte Falls, 2,000 ft.; Eagle Ridge, Klamath Lake), Wyoming (Rawlins, Carbon Co., 6,800 ft.; Jackson, Teton Co., 6,300 ft.) and Nevada (Ormsby Co.). At the U.S.N.M. there is a ♀ labelled Bellevue, Washington Co., Utah, but this may be due to some error.

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[7] The date 1903 on the front page of the part of ''Invertebrata Pacifica'' containing the descriptions of *A. spilogaster, A. trichionotus* and *A. ormsbyensis* is an error, as that part was issued in October 1905.

Structural Characters and Affinities.—*A. spilogaster* is a puzzling wasp, combining some of the characters of *A. waldenii* and *A. catskillensis.* The short, broad thorax with the wide humeral margin, strongly produced at the sides in the ♂, as well as the shape of the clypeus, separate it from *catskillensis.* From *A. waldenii* it differs in the shape of the head, the upper outer orbit being much narrower in profile, at most as wide as the upper part of the eye (above the sinus), and somewhat swollen; seen from above, the sides of the head are slightly humped. The clypeus of the ♂ is nearly as long as wide or slightly longer and its apical notch is about midway between that of *A. waldenii* and *A. catskillensis.* It should be noted that the humeral angles vary much in shape. Dr. R. M. Bohart pointed out to me the following differences in the propodeum: in *spilogaster* the concavity (within the rim) is more roughened, more striate than in *A. waldenii,* and the superior ridge is more distinct and somewhat lamellar in the upper corner. He also states that the posttegulae (or parategulae) are much heavier, broader and blunter than in *A. waldenii.* Perhaps *A. spilogaster* is a relatively recent offshoot from the *waldenii* stock.

Color Pattern and Variation.—The ♀ of *A. spilogaster* is often extensively marked with bright yellow, more so than in most other North American *Ancistrocerus.* All tergites bear a wide apical fascia; tergite 6 bears a large preäpical spot or is mostly yellow; the venter is often mostly yellow; tergite 2 always has a discal spot on each side, connected with the apical fascia, the spots often stripe-like or acuminate, almost touching in the middle. The fascia of tergite 1 is much widened at the sides and often sends out extensions along the carina. The clypeus is either entirely yellow or has a black median spot. Sometimes the mandibles are entirely yellow. The sides of the propodeum are often extensively yellow. The posttegulae are yellow. Frequently, but not always, there are a pair of yellow spots or streaks on the disk of the mesonotum, inside the notaulices. This is notably the case in the allotype, a ♀ from Bass Lake, California, in the R. M. Bohart Collection. The markings are more reduced in the ♂, where the discal spots of tergite 2 are sometimes small and free, while the posttegulae and mesonotum are always black.

Habits.—The habits of *A. spilogaster* agree with those of *A. catskillensis,* not with those of *A. waldenii.* Dr. R. M. Bohart reared it from nests in old oak-galls at Davis, California; while his brother, Mr. G. E. Bohart, bred it from nests in twigs.

4. *Ancistrocerus catskillensis* (de Saussure).

Range.—*A. catskillensis* is common over nearly the entire United States (with the possible exception of Florida, Alabama, Mississippi and Louisiana) and the southern parts of the Dominion of Canada. In the northeast it extends to southern Labrador and in the northwest far into Alaska (59° N.) and the North West Territories (65° N.).

Structural Characters and Affinities.—While ♀ of *A. catskillensis* and *A. tigris* are readily separated, their ♂ are very similar. Even in the ♂, however, the thorax and first abdominal segment are decidedly more slender in *A. tigris,* as may be seen by placing the two species side by side. The notaulices of the ♀ are usually limited to the hind third of the mesonotum in *catskillensis,* while in *tigris* they are more developed, often running over the disk to the anterior margin. In both sexes the head in front view is more nearly circular in *tigris* than in *catskillensis.* In the ♂ of *catskillensis* the segments of the flagellum are shorter, more stubby than in *tigris.*

In 1925 I mentioned what were believed to be reliable structural differences between *catskillensis* and *albophaleratus;* but a study of more extensive material has shown that these characters are too variable. Some specimens with bright yellow markings are structurally like others with white markings. Sometimes (particularly in Oregon and British Columbia) it is, moreover, difficult to decide whether the markings should be called white or yellow. Occasionally they are pure white on abdomen and more yellowish on head and thorax. No clear-cut structural distinction could be found between *catskillensis* and the Californian *halophilus,* and, as discussed below, *durangoensis* appears to be an extreme variant of the same species. *A. parietinus* (Linné) seems to be the nearest Old World relative of *catskillensis;* but it has a relatively wider clypeus in both sexes.

It should be noted that the width and emargination of the clypeus of the ♂ vary in all forms of *A. catskillensis,* even among specimens from the same locality. Although the notch is never as deep and narrow as in *A. waldenii,* it scarcely differs in some specimens from that of *A. spilogaster.*

Color Pattern and Variation.—As here understood, the structural species *A. catskillensis* comprises four fairly well-marked color forms, separable as follows:

1. Body markings white or creamy-white; tergite 2 without lateral spots, wings somewhat russet along costa. var. *albophaleratus.*
   Body markings yellow or yellowish .... 2.

2. Tergite 2 with apical yellow margin only; no discal spots; wings grayish throughout; apical edge of tergites 1 and 2 thin and flat, the preäpical area not more coarsely punctate than the base .... typical *catskillensis.*

 Disk of tergite 2 usually with a pair of yellow spots, often connected on the sides with the apical margin; wings with a yellowish tinge; if without discal spots on tergite 2, apical edge of tergites 2 and 3 thickened or raised and preäpical area more coarsely punctate .... 3.

3. Apical edge of tergites 2 and 3 somewhat thickened or raised; preäpical area more coarsely punctate than disk. (Rocky Mountain States) .... var. *durangoensis.*

 Apical edge of all tergites equally thin and flat; puncturation of abdomen uniform throughout. (Pacific Coast States). var. *halophilus.*

4*a*. Typical *A. catskillensis.*

Odynerus (*Ancistrocerus*) *catskill* H. de Saussure, Et. Fam. Vesp., I, p. 136, 1853 (♀♂; Catskill, New York).

Odynerus (*Ancistrocerus*) *catskillensis* H. de Saussure, Et. Fam. Vesp., III, p. 204, 1855 (author's emendation).

Odynerus catskilli H. de Saussure, Smithson. Misc. Coll., No. 254, p. 168, 1875 (as a synonym of *A. catskillensis*).

Odynerus daedalus [T. W. Harris, in E. Hitchcock, Rept. Geol. Miner. Bot. Zool. Massachusetts, 2d Ed., p. 589, 1835 (*nomen nudum;* Massachusetts)]. H. de Saussure, Smithson. Misc. Coll., No. 254, p. 160, 1875 (*"daedaleus";* as a doubtful synonym of *A. tigris*).

Ancistrocerus sexcingulatus Ashmead, Psyche, IX, p. 185, 1901 (♂; New Mexico).

Ancistrocerus trichionotus Cameron, Invertebrata Pacifica, I, pp. 120 and 121, 1905 (♂, Stanford University, California).

? *Ancistrocerus ormsbyensis* Cameron, Invertebrata Pacifica, I, pp. 120 and 121, 1905 (♂; Ormsby Co., Nevada).

Ancistrocerus gunnisonensis Cameron, Invertebrata Pacifica, I, p. 146, 1906 (♂; Gunnison, Colorado).

Ancistrocerus gunnistonensis Cameron, Trans. Amer. Ent. Soc., XXXIV, p. 213, 1908 (misspelling of *gunnisonensis*).

Synonymy.—A more careful study of the type of *A. sexcingulatus,* at the U.S.N.M., leads me to refer it to *A. catskillensis,* rather than to *A. tigris,* as I was inclined to do in 1925. A ♂ from Colorado, sent under the name *sexcingulatus,* was compared by Mr. Soika with what is almost certainly the true type of *gunnisonensis* and said to be not separable. As the types of both *sexcingulatus* and *gunnisonensis* lacked discal spots on tergite 2, these names must be synonymized with typical *catskillensis.* The descriptions of *trichionotus* and *ormsbyensis* do not mention discal spots on tergite 2, so it is assumed that the true types lacked them. There is a possibility that *A. ormsbyensis* was my *A. neocallosus,* but Cameron does not describe the shape of sternite 2. In this paper I list *O. adiabatus* de Saussure and *O. pertinax* de Saussure as doubtful synonyms of *A. tigris;* but they could equally well have been *A. catskillensis. O. daedalus,* listed by Harris without a description, was doubtfully referred to *A. tigris* by de Saussure, who evidently saw none of Harris' specimens. In the Harris Collection, now on deposit at the M.C.Z., the only specimens definitely referred to *daedalus* are two ♀ of *catskillensis.* In Harris' manuscript catalogue of his collection the name *daedalus* is credited to "Say Ms." The name is not mentioned in the first Edition of Hitchcock's Report (1833).

Range.—Typical *catskillensis* occurs across the Continent over most of the range of the species in the United States, but appears to be rare in the Dominion of Canada. I have seen specimens from Nova Scotia (Kempt Shore), Maine, New Hampshire, Massachusetts, Vermont, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Maryland (College Park), West Virginia, Georgia (Neel Gap; Rabun Bald; Blood Mt.), Ohio, Indiana, Illinois, Michigan (East Lansing), Wisconsin (Moose Lake; Hayward), Missouri (St. Louis; Willard), Iowa (Sioux City), Minnesota (St. Paul; Olmsted Co.), Kansas (Baldwin), Nebraska, Texas, New Mexico (Jemez Springs), Colorado (Boulder Co.; Cimmaron; Rockwood; Idaho Springs; Bayfield), Arizona (Flagstaff), Utah (Logan; Beaver Creek Hills; North Fork, Duchesne River; Arch Canyon), South Dakota (Brookings; Spearfish), North Dakota (Fargo), Idaho (Mt. Moscow; Wallace), Wyoming (Green River; Rawlins; Jackson; Yellowstone National Park), Nevada (Ormsby Co.; Reno), California (Berkeley and the mountainous districts in general), Oregon (Grant Co.; Harney Co.; Baker Co.; Linn Co.; Lake Co.; Klamath Co.; Hood River; etc.; common), the State of Washington (Helena; Wawawai; Orcus Id.; Pullman; N. Yakima), and British Columbia (Ashcroft; Salmon Arm; Kamloops; Vancouver; Royal Oak; Newcastle Id.; Departure Bay; Snake Id.; etc.). Provancher (Add. Faune Canada, Hym., p. 419, 1888) reported it from Quebec

(Cap Rouge) and A. W. A. Brown from Ontario (Timagami) (Canad. Entom., LXVI, p. 264, 1934). It should be looked for in Delaware, North Carolina, South Carolina, Kentucky, Tennessee, Arkansas, Oklahoma, and Montana. Additional specimens were seen from Ontario (Ottawa; Toronto; Guelph; Pt. Pelee; etc.), Quebec (Aylmer; Hull; Laniel; Fort Coulonge; etc.), New Brunswick (Fredericton), Prince Edward Island (Brackley Beach, Can. Nat. Pk.), Manitoba (Cormorant Lake) and Alberta (Lethbridge; Waterton).

Color Pattern and Variation.—Typical *catskillensis* usually has apical yellow fasciae on all segments, but no spot on tergite 6 in the ♀, that sex having the sides of the propodeum as a rule more or less yellow and the posttegulae often partly yellow. Some ♀ from Utah, Colorado, Arizona, Wyoming and Oregon have the yellow spot on tergite 6, while others lack yellow on the propodeum. I have seen no ♂ with yellow on the sides of the propodeum; in most of them the posttegulae are black, but sometimes they bear a minute yellow dot. The flagellum is yellowish-russet beneath over most of the length in both sexes, including the entire terminal segment in the ♂.

Habits.—J. G. Myers (Ent. Mo. Mag., LXIII, pp. 190–196, 1927) published an account of the nesting habits of typical *catskillensis* and of its parasite, the tachinid fly, *Pachyophthalmus signatus* (Meigen), near Boston. P. Rau (Bull. Brooklyn Ent. Soc., XXX, p. 111, 1935) observed it in Missouri nesting in old mud-nests of *Pelopaeus,* in abandoned burrows in the ground made by the bee, *Anthophora abrupta* Say, as well as in nail-holes and key-holes of a house. This wasp is often taken stylopized (G. Salt and J. Bequaert, Psyche, XXXVI, p. 259, and p. 260, as *A. sexcingulatus,* 1929).

4*b*. *A. catskillensis* var. *albophaleratus* (de Saussure). Figs. 2A–G.

Odynerus (*Ancistrocerus*) *albophaleratus* H. de Saussure, Et. Fam. Vesp., III, p. 217, 1855 (♀♂; "Arctic America").

Range.—I have seen the var. *albophaleratus* from Newfoundland, Anticosti Island, Nova Scotia, New Brunswick (St. John), Quebec, Ontario, Maine, New Hampshire, Vermont, Massachusetts, New York, Pennsylvania (Huntington), Maryland, North Carolina (Blowing Rock), Ohio (Put-in-Bay), Illinois (Urbana), Michigan (Isle Royale; Manistigue), Wisconsin (Worden Township, Clark Co.), North Dakota, South Dakota (Harney Peak), New Mexico, Arizona (north rim of Grand Canyon, 8,000–9,100 ft.), Texas, Colorado, Utah, Montana (La Salle), Wyoming, Idaho, California

(Giant Forest, 6,400–7,000 ft.; Goose Lake, Siskiyou Co.), Oregon (Mt. Hood; Grant Co.), the State of Washington (Rainier National Park; Mt. Vernon), Manitoba (Cedar Lake; Le Pas near Winnipeg), Saskatchewan (Oxbow), Alberta, British Columbia, Vancouver Island, and Alaska. It has on the whole a more boreal distribution than typical *catskillensis,* being one of two solitary vespids extending the farthest north on the American continent. It has been taken in southern Labrador on the Lower Matamek River (50° 20′ N.) by H. Eidmann (Arb. Morph. Tax. Ent., Berlin-Dahlem, II, p. 104, 1935). In Manitoba it reaches Cedar Lake (53° N.); in Alberta, Lesser Slave Lake (53° 30′ N.); and in Alaska, Fox Point (54° 30′ N.), Kukak Bay (58° N., on Alaska Peninsula), and Saldovia (59° N., on Kenai Peninsula). In the southern part of its range it prefers higher altitudes, being chiefly a wasp of the Canadian and Transition life-zones; but in some localities, notably near Boston, it occurs together with typical *catskillensis.* Additional specimens were examined from Prince Edward Island (Dalvay House and Brackley Beach, Can. Nat. Pk.) and North West Territories (Fort Rae, Great Slave Lake, 62° 30′ N.; Fort Simpson, 61° 30′ N., Fort Wrigley, 63° N., and Fort Norman, 65° N., on the Mackenzie River).

Color Pattern and Variation.—In the var. *albophaleratus* the pale markings may become much reduced. The number of apical bands of the abdomen varies from three to five in the ♀ and from four to six in the ♂. I have seen a few ♀ (from Staples, Minnesota, and Spruce Brook, Newfoundland) with a discal spot on tergite 6. The propodeum is rarely spotted (very broadly so in the ♀ from Staples, Minnesota) and even the spots on the scutellum may disappear. As typical *A. waldenii* and the var. *albophaleratus* are colored alike and often found together, they are sometimes confused in collections. Placed side by side they are readily separated by the more stubby thorax of *waldenii,* which, seen from above, is decidedly wider at the tegulae than the head. The upper outer orbit is also wider in *waldenii* than in *albophaleratus.*

Habits.—As noted before (1925), *albophaleratus* is prone to nest in deserted cynipid oak-galls. At the A.M.N.H., there are specimens bred by Zabriskie from galls of "*Amphibolips confluens* Harris" at Nyack, N. Y.

A ♂ from Joliette, Quebec, bear a ♀ Strepsipteron protruding below the hind margin of tergite 3. It differs from a normal ♂ only in the clypeus being narrowly black at the base and having an irregular median black band over the upper three-fourths.

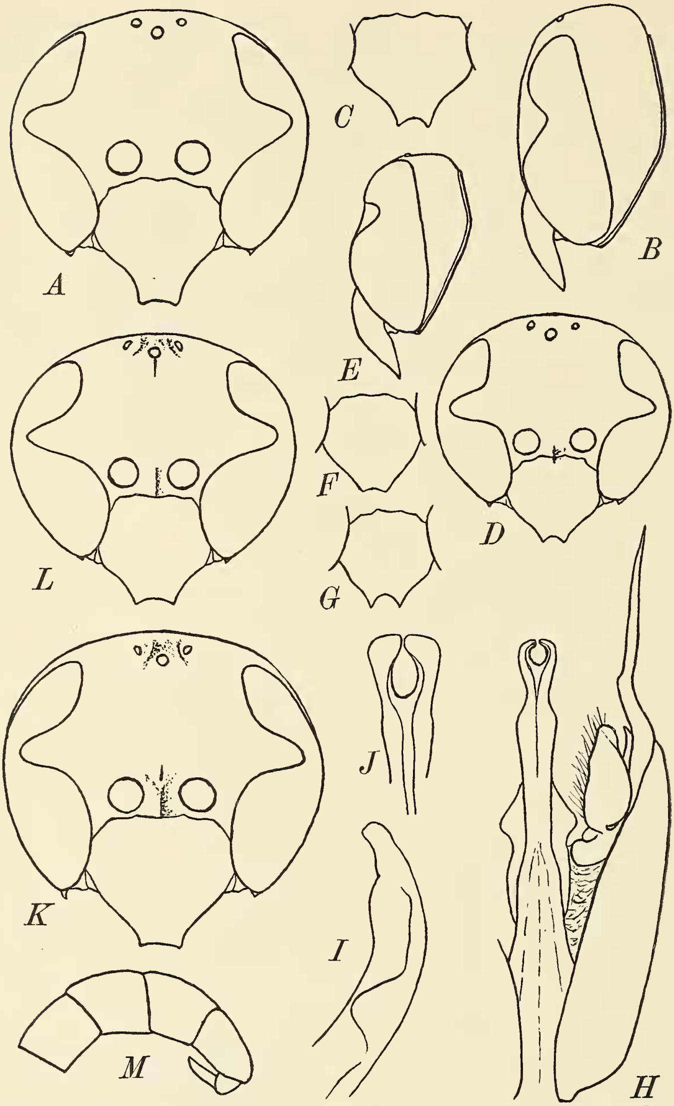

FIG. 2. A–G, *Ancistrocerus catskillensis* var. *albophaleratus* (de Saussure): A, head ♀ in front view, Fairlee, Vt.; B, same in profile; C, clypeus ♀, Banff, Ata.; D, head ♂ in front view, Chittenden, Vt.; E, same in profile; F and G, clypeus of two other ♂, Chittenden, Vt.—H–J, *Ancistrocerus antilope* (Panzer): H, ♂ terminalia, North Conway, N. H.; I, aedeagus in profile; J, tip of aedeagus.—K–M, *Ancistrocerus parredesi* (de Saussure): K, head ♀ in front view, La Fuente, Costa Rica; L, head ♂ in front view, Oaxaca, Mexico; M, tip of antenna ♂, Oaxaca.

Stylopized *albophaleratus* are by no means rare (G. Salt and J. Bequaert, Psyche, XXXVI, p. 258, 1929).

4c. *A. catskillensis* var. *halophilus* Viereck.

Ancistrocerus halophila Viereck, Proc. Ac. Nat. Sci. Phila., LIV, p. 735, 1902 (♂; San Pedro, California).

Ancistrocerus fulvitarsis Cameron, Trans. Amer. Ent. Soc., XXXIV, p. 205, 1908 (♀♂; Santa Clara Co., California).

Ancistrocerus tahoensis Rohwer, Proc. U. S. Nat. Mus., LIII, p. 235, 1917 (♀; Tahoe, Eldorado Co., California).

Synonymy.—The types of *halophilus* (at Phila.A.S.) and of *tahoensis* (at U.S.N.M.) were examined both by myself and by Dr. R. M. Bohart; we agree that they were based on the opposite sexes of the same race of *A. catskillensis.* Of *A. fulvitarsis* I have seen a ♀ thus labelled from the type locality, in the Baker Collection at Pomona College. It agrees with the original description, but is probably not one of the true types.

Range.—The var. *halophilus* is one of the common wasps in the Pacific Coast states. I have seen it from California (common nearly everywhere), Nevada (Ormsby Co; Reno), Oregon (Forest Grove; Cornelius; 12 miles south of Parkdale; Drake's Peak, 8,200 ft.), the State of Washington (Pullman; Blue Mts.), and southern British Columbia (Vancouver; Lytton, Salmon Arm). In northern California, Oregon and Nevada it intergrades with typical *catskillensis.*

Color Pattern and Variation.—The extent of the yellow markings on the abdomen varies, even in the same locality, all intergrades to typical *catskillensis* being found. One ♀ of typical *catskillensis,* from Big Cottonwood Canyon near Salt Lake, Utah, has a yellow dot on one side only of tergite 2. Sometimes sternite 2 bears a pair of yellow discal spots, while tergite 2 lacks them.

The specimens from Pacific Grove, which I discussed in my earlier paper, following my account of *A. birenimaculatus* (1925, p. 98), were var. *halophilus.* Davidson's supposed *birenimaculatus,* from California, might have been either var. *halophilus* or *A. spilogaster.*

Habits.—A ♂ from Oroville, California, was labelled: "bred from a gall of *Andricus californicus.*"

4d. *A. catskillensis* var. *durangoensis* Cameron.

Ancistrocerus durangoensis Cameron, Trans. Amer. Ent. Soc,. XXXIV, p. 216, 1908 (♂; Durango, Colorado).

[*Ancistrocerus behrensi* "Cr." Tucker, Trans. Kansas Ac. Sci., XXII, p. 286, 1909 (no sex; no description; Buffalo, Colorado). J. Bequaert, Trans. Amer. Ent. Soc., LI, p. 111, 1925 (no description).]

Synonymy.—A ♂ from Chimney Gulch, Colorado, was sent to Dr. Soika for comparison with what appears to be the true holotype of *durangoensis.* Dr. Soika returned it with a note: "differs from *A. durangoensis* only in the clypeus a little less emarginate and with more superficial punctures." This particular ♂ had the apical margins of tergites 2 and 3 slightly collar-like and more raised than in other ♂ taken with it. Specimens at Phila.A.S. labelled "*A. behrensi*" by Cresson are clearly the var. *durangoensis.*

Range.—The var. *durangoensis* replaces the var. *halophilus* in the Rocky Mountain states, extending into New Mexico and Texas. It is particularly common in Colorado (Chimney Gulch, Golden; Turkey Creek Canyon; Pike's Peak; Manitou; Rocky Mt. National Park; Estes Park; Boulder; Cripple Creek Road to Mt. Corley, 9,000 ft.; Princeton Hot Springs; Cimarron; Rock Creek near Colorado Springs); but I have also seen it from Utah (Uinta Co.; Vivian Park; Park City; Beaver Creek; Bryce Canyon National Park; Eureka), Wyoming (Buffalo), Arizona (Humphrey's Peak, 9,500 ft.; Flagstaff, at flowers of *Ceanothus fendleri* A. Gray; Oak Creek Canyon), New Mexico (Jemez Mts.; Santa Fé), and Texas (collected by Belfrage, without more definite locality).

Structural Characters and Affinities.—The var. *durangoensis* differs somewhat in structure from the other color forms of *A. catskillensis.* I have been long in doubt as to its status, having given it at first specific rank. It should probably be regarded as a "beginning species" or subspecies. There is sometimes a trace of a longitudinal median furrow at the base of sternite 2. The apical margins of tergites 2 and 3 are more or less thickened and often somewhat raised, while the preäpical depressions are more coarsely punctate than the basal areas. In some specimens the apical margins may even form low collars; but I find all transitional stages between these and others which do not differ in this respect from Californian specimens of *halophilus.* On the whole it would seem that the relations between var. *durangoensis* and var. *halophilus* are of the same order as those existing between typical *A. antilope* and its Rocky Mountain variety *navajo.*

Color Pattern and Variation.—The var. *durangoensis* is colored much like var. *halophilus* and equally variable. Tergite 6 of the ♀ usually bears a yellow spot and the posttegulae a yellow dot; but the mesonotum is not marked with yellow. In some specimens the yellow has a slight orange tinge. It may cover most of tergites 1 and 2; or these tergites may have apical fasciae and small discal spots not or narrowly connected with the fascia; or there may be no discal spots at all, in which case the specimen is referred to var. *durangoensis* because of the thickened or raised apical margins. When the discal spots are lacking, the distinction between *durangoensis* and typical *catskillensis* is sometimes arbitrary.

5. *Ancistrocerus tigris* (H. de Saussure).

Range.—*A. tigris* covers about the same territory as *A. catskillensis,* but it has never been taken in Alaska. It extends also somewhat farther south in the eastern United States, Florida being the only state from which it has not been recorded.

Structural Characters and Affinities.—These have been discussed under *A. catskillensis.* The closest Old World relative of *tigris* appears to be *A. trifasciatus* (Müller) and I have been unable to find consistent structural differences between the two. However, in view of the confusion now prevailing in the taxonomy of the European *Ancistrocerus,* it would seem premature to unite the two species.

Brother J. Ouellet sent me a curious abnormal ♂ of typical *tigris* from Joliette, Quebec. The left antenna has only 12 segments, the twelfth being hook-like but much stouter than usual, evidently the fused segments 12 and 13; the right antenna is normal. The specimen is not stylopized nor stunted.

Color Pattern and Variation.—The color variants of *A. tigris* parallel closely those of *A. catskillensis.* Three color forms appear to be sufficiently stable to warrant naming.

1. Body markings creamy-white and much reduced; apical fasciae narrow and present on some of the abdominal segments only; tergite 2 without discal spots .... var. *albolacteus.*
   Body markings yellow, often very extensive; apical fasciae of abdomen broad .... 2.
2. Abdomen with apical fasciae only; no discal spots on tergite and sternite 2; wings slightly grayish or smoky...... typical *tigris.*
   Tergite 2 with a pair of discal spots, either free or connected on the sides with the apical fascia; sternite 2 often extensively yellow; wings tinged with amber-yellow........... var. *cytainus.*

5*a*. Typical *A. tigris.*

?*Odynerus* (*Ancistrocerus*) *adiabatus* H. de Saussure, Et. Fam. Vesp., I, p. 138, 1853 (♂; Carolina).

?*Odynerus* (*Ancistrocerus*) *pertinax* H. de Saussure, Et. Fam. Vesp., III, p. 216, 1855 (♂; New York).

Odynerus (*Ancistrocerus*) *tigris* H. de Saussure, Rev. Mag. Zool., (2) IX, p. 273, 1857 (no sex; Pennsylvania).

Odynerus (*Ancistrocerus*) *cervus* H. de Saussure, Rev. Mag. Zool., (2) X, p. 165, 1858 (no sex; Canada).

Ancistrocerus quebecensis Cameron, Trans. Amer. Ent. Soc., XXXII, p. 333, 1906 (♂; Montreal, Canada).

Odynerus monteregalis Meade Waldo, Ann. Mag. Nat. Hist., (8) XIV, p. 405, 1914 (new name for *Odynerus canadaensis* ''Cameron,'' a manuscript name, apparently on the label of the type of *quebecensis;* Montreal).

Odynerus (*Ancistrocerus*) *canadaensis* ''Cameron'' Meade Waldo, Ann. Mag. Nat. Hist., (8) XIV, p. 405, 1914 (as a synonym of *O. monteregalis* Meade Waldo). Not *Odynerus canadensis* H. de Saussure, 1855.

Ancistrocerus tenuatus Tucker, Trans. Kansas Ac. Sci., XXII, p. 286, 1909 (November) (♀; Denver, Colorado).

Ancistrocerus howardi Cameron, Pomona Jl. Entom., I, p. 78, 1909 (October) (♀; Lee Co., Texas).

Synonymy.—It is unfortunate that *adiabatus* and *pertinax* have not been recognized, as both names antedate *tigris.* The type of *adiabatus* should be at the Paris Museum, that of *pertinax* at the British Museum. Probably *adiabatus* was based on the ♂ of *tigris,* as the description states: ''Premier segment de l'abdomen allongé, en cloche, finement ponctué.'' Also no mention is made of yellow spots on the scutellum, which are usually absent in ♂ *tigris* and more often present in ♂ *catskillensis.* The types of both *tigris* and *cervus* are probably in de Saussure's collection at the Geneva Museum, but they have never been critically studied. In 1875 (Smithson. Misc. Coll., No. 254, p. 160) de Saussure synonymized *cervus* with *tigris,* a procedure here accepted. The type of *quebecensis,* which Cameron had labelled *canadaensis,* is now at the British Museum, where I recognized it as *A. tigris* (Ann. Mag. Nat. Hist., (10) II, p. 172, 1928). Dr. R. M. Bohart examined the type of *tenuatus,* in the Kansas University Collection, and recognized it as a very brightly marked but typical *tigris.* At Pomona College a specimen of brightly colored *tigris* is labelled ''*A. howardi* Cameron,'' but it is probably not the true type.

Range.—Typical *A. tigris* is common and widely distributed over the United States and southern parts of the Dominion of Canada. I have seen it from Newfoundland (St. Anthony), Quebec (Montreal;

Joliette; Berthierville), Ontario (Ridgeway), New Brunswick (Red Head, St. John), Nova Scotia (Baddeck, Cape Breton; Portaupique), Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware (Dover), Maryland, Virginia, West Virginia, North Carolina (Raleigh), South Carolina (Dewees Id.), Georgia (Tray Mt.; Rabun Bald; Hartwell), Alabama (Mobile), Tennessee (Clingman's Dome, Great Smokies, 6,400 ft.), Texas, Missouri, Ohio, Michigan (Isle Royale; Douglas Lake; Michiganne), Indiana (Turkey Run), Illinois, Wisconsin, Iowa (Sioux City; Dickinson Co.; Howard Co.; Louisa Co.; Tama Co.; Henry Co.), Minnesota (Rochester; Olmsted Co.), North Dakota (Bottineau), South Dakota, Kansas (Riley Co.), Nebraska (Butte), New Mexico (Las Vegas; Jemez Springs), Colorado (Chimney Gulch), Utah (Bryce Creek), Wyoming (Green River), Idaho (Coeur d'Alene; Moscow, etc.), Montana (Bolton), the State of Washington (Orcus Id.; Pullman; Walla Walla; Knightmere), Oregon (Lake-of-the-Woods, 4,950 ft.; Grizzly Butte) and California (Portola; San Jacinto Mts.). Specimens were also seen recently from Prince Edward Island (Dalway House and Brackley Beach, Can. Nat. Pk.), Manitoba (Aweme; Winnipeg; Emerson) and British Columbia (Agassiz; Vancouver; Victoria; Pender Harbor; Okanagan Falls; Saanich District).

Color Pattern and Variation.—The specimens here referred to typical *tigris* are rather uniformly marked with yellow. The apical fasciae of the abdomen are usually moderately wide and present on all or most of the tergites; but tergite 6 lacks a spot. On tergite 1 the sides of the fascia are, as a rule, slightly widened or preceded by a small free spot. The ♀ has normally spots on the scutellum and mesopleura, a cross-band or spots on the postscutellum, a broad humeral band on the pronotum, and the tegulae yellow with a large black spot. (The few specimens of *A. trifasciatus* seen, have the thorax almost entirely black, including the tegulae.) The ♂ is often spotted only on pronotum, tegulae and scutellum. I have seen no specimens with yellow on the propodeum. The flagellum is colored either as in typical *catskillensis,* or less extensively russet-yellow beneath. Some ♀ are more yellow than usual and agree with the descriptions of *howardi* and *tenuatus:* clypeus mostly yellow; thoracic markings and apical fasciae of abdomen very extensive; fascia of tergite 1 abruptly widened laterally; tergite 6 sometimes with yellow spot, but propodeum not marked with yellow; wings often with a yellowish tinge. Such specimens, however, pass gradually to more normal *tigris.* They occur sporadically over much of the range of typical *tigris* and together with it, as I have seen them from New Jersey (Ramsey), New York (Long Island), North Carolina (Dewees Id.), Texas (Fedor, Lee Co.; Dallas), Colorado (Boulder), and Wyoming (Green River). Those who wish, nevertheless, to use a varietal name for such specimens, will have to call them var. *howardi* Cameron, that name apparently antedating *tenuatus* Tucker by one month.

Habits.—Professor A. C. Kinsey sent me two ♀ of typical *A. tigris* bred from an oak-gall of *Disholcaspis globulus* (Fitch), on *Quercus alba,* collected at Hartwell, Georgia. V. A. Daecke obtained the ichneumonid parasite, *Acroricnus junceus* (Cresson), from a nest of *A. tigris* in Pennsylvania (A. B. Champlain, Psyche, XXIX, p. 99, 1922). Typical *tigris* is often found stylopized (G. Salt and J. Bequaert, Psyche, XXXVI, p. 260, 1929). W. D. Pierce described the Strepsipteron, *Pseudoxenos tigridis* Pierce, from wasps of this species in Illinois, and R. M. Bohart (Univ. Calif. Publ. Ent., VII, No. 6, p. 144, 1941) has added several records of this parasite in the same host from Ontario, New York and California.

5*b*. *A. tigris* var. (or subsp.) **albolacteus,** new.

Female.—Pale markings much reduced and white, creamy-white, or ivory-white, as follows: two small preäpical spots on clypeus, often wanting; a spot on lower inner orbit, close to clypeus; a spot between antennae; a dot on upper outer orbit; narrow under side of scape; a small streak on base of mandible; narrow humeral margin; a small spot on upper mesopleuron; two spots on tegula; sometimes a pair of minute dots on scutellum; a short and narrow cross-band on postscutellum (sometimes lacking); very narrow apical margins on tergites 1 to 4 and sternite 2, not produced forward nor widened at the sides; a spot on each side at apex of sternite 3; extreme tips of femora and most of outside of tibiae. Tip of flagellum beneath and fore tarsi somewhat rufous. Wings with a slight russet tinge.

Male.—Clypeus mostly whitish. Thorax black, except for small spots on tegulae (sometimes absent) and narrow humeral cross-band. Narrow apical bands on tergites 1 to 4 or 1 to 5. Most of tarsi also whitish. Only 3 or 4 terminal segments of antennae pale russet beneath.

This form seems to be smaller, on the average, than typical *tigris.*

Range.—British Columbia: Kamloops, ♀ holotype (G. J. Spencer); Nicola, ♂ paratype (G. J. Spencer); Departure Bay.

♂ paratype (G. J. Spencer); Kaslo, ♀♂ paratypes (R. P. Currie); Revelstoke, Selkirk Mts., ♀ paratype (J. C. Bradley); Ainsworth, ♀ paratype (R. P. Currie); Carbonate, Columbia River, ♀ and ♂ paratypes (J. C. Bradley); Big Bend Country, Selkirk Mts., ♂ paratype (J. C. Bradley).—Alberta: Banff, 5,000 to 6,000 ft., ♀ paratype (O. Bryant).—State of Washington: without definite locality, ♀ paratype (T. Kincaid); White River, Mt. Rainier, at flowers of *Heracleum,* ♂ paratype (A. L. Melander).—Oregon: Hood River, ♀ paratype (K. Gray and J. Schuh); 2 miles west of Paulina Lake, ♂ paratypes (K. Gray and J. Schuh); Grizzly Butte, ♂ paratype (K. Gray and J. Schuh); 4 miles north of Crescent, ♂ paratype (H. A. Scullen); Drake's Peak, 8,200 ft., ♀ paratype (H. A. Scullen); 5 miles west of Suttle Lake, ♂ paratype (K. Gray and J. Schuh); Corvallis, ♂ paratype (E. V. Storm); Pamelia Lake, Mt. Jefferson, about 3,000 ft., ♂ paratype (J. C. Bridwell).—Idaho: Priest Lake, ♀ paratype (C. V. Piper); Moscow, ♂ paratype.—Montana: Beaver Creek, 6,300 ft., ♀ paratype (S. J. Hunter).—Wyoming: Yellowstone National Park, ♀ and ♂ paratypes (F. E. Lutz); Madison Junction, Yellowstone Park, ♀ paratype (A. Melander); Jenny Lake, Great Teton National Park, ♂ paratypes (G. E. Bohart); Snake River, ♀ paratype (W. B. Sheppard).—South Dakota: Harney Peak, ♂ paratype (H. C. Severin).—Colorado: Pike's Peak, ♀ paratype (W. M. Wheeler); Estes Park, Larimer Co., ♂ paratype (F. E. Lutz); Aspen, Pitkin Co., 8,000 ft., ♂ paratype (F. E. Lutz); Ouray, Ouray Co., 8,500 ft., ♂ paratype (F. E. Lutz); Tennessee Pass, Lake Co., 10,300 ft., ♀ paratype (F. E. Lutz); Ward, Boulder Co., 10,500 ft., ♀ and ♂ paratypes (F. E. Lutz); Malta, Lake Co., 10,000 ft., ♀ paratype (F. E. Lutz); Cimarron, Baca Co., ♀ paratype (R. C. Shannon); Boulder, ♂ paratype (T. D. A. Cockerell); Florissant, ♂ paratype (S. A. Rohwer); Pingree Park, ♂ paratype (R. H. and L. D. Beamer); Cascade Lodge, Rocky Mountain National Park, ♂ paratype (H. C. Severin); Elk Creek, Fraser, Grand Co., ♀♂ paratypes (J. C. Bradley).—Quebec: St. Jerôme de Matane, ♂ paratype (Klots).—Holotype, allotype and paratypes at M.C.Z.; paratypes in Bohart Collection, at U.S.N.M., Cal.A.S., A.M.N.H., Phila.A.S., Un.B.C., Or.St.Coll., and Corn.Un. Additional paratypes at Can. Agr. Ent. are from British Columia: Copper Mountain, ♀♂ (G. Stace Smith); Hazelton, ♀ (W. B. Anderson); Midday Valley, Merritt, ♀♂ (R. Hopping); Aspen Grove, ♀♂ (H. Richmond); Chilcoot Pass, ♀ (White, Fraser and Smith); Chilcotin, ♂ (E. R. Buckell); and from Alberta: Waterton, ♀ (H. L. Seamans).

Habits.—I have seen several stylopized specimens. One ♀ from Drake's Peak, Oregon, with a stylops beneath the hind margin of tergite 3, shows no modification in color. A ♂ from Harney Peak, South Dakota, and another from 2 miles west of Paulina Lake, Oregon, have a stylops beneath the hind margin of tergite 3; in both the clypeus is extensively black and irregularly blotched with white.

5c. *A. tigris* var. *cytainus* (Cameron).

Odynerus cytainus Cameron, Invertebrata Pacifica, I, p. 149, 1906 (♀; Claremont, California).

Synonymy.—Cameron's name *cytainus* is here used for the richly marked Californian form of *tigris,* at Dr. Bohart's suggestion. He saw a specimen labelled "*cytainus*" in the Baker Collection at Pomona College; but this was probably not the true type. It seems strange, though not impossible, that Cameron overlooked the carina of tergite 1, not mentioned in the original description. In a later paper (Trans. Amer. Ent. Soc., XXXIV, p. 205, 1908) he places *cytainus* in a section of *Ancistrocerus* (apparently owing to the similarity in color pattern), but states that it "appears to belong to *Odynerus* s. str."

Range.—The var. *cytainus* is known only from California (Azusa; Dunsmuir; Pasadena, Siskiyou Co.; Berkeley; Monrovia; Pacific Grove; Yosemite; Fort Seward; etc.) and Oregon (Corvallis; 10 miles south of The Dalles; 10 miles west of Bend; Hood River). According to Dr. R. M. Bohart, it is found in California more often at moderate to low elevations and is replaced by typical *tigris* at altitudes above 8,000 ft. in the central Sierras and at gradually lower elevations toward the north. In Oregon it is found only along the coast. The allotype is a ♂ from Yosemite, at the M.C.Z.

Color Pattern and Variation.—The ♀ of var. *cytainus* is often very extensively marked with yellow, there being discal spots on both tergites 1 and 2, as well as on sternite 2, usually broadly connected with the apical fasciae; those of tergite 2 sometimes almost meet in the middle. In the ♂ the discal spots are much smaller and may dwindle to dots. A ♀ from Dunsmuir, California, has a pair of narrow, elongate spots behind the middle of the mesonotum. Moreover, transitions to typical *tigris* are by no means rare in California. They usually lack discal spots on tergite 2 or on tergites 1 and 2, but retain large spots on the disk of sternite 2.

6. *Ancistrocerus parietum* (Linné).

Vespa parietum Linné, Syst. Nat., 10th Ed., I, p. 572, 1758 (no sex; no locality; as there is a reference to the Fauna Suecica, Sweden may be taken as the type locality).

Ancistrocerus tardinotus [''Bequaert'' L. H. Taylor, Psyche, XXIX, p. 49, 1922 (*nomen nudum*)]. J. Bequaert, Trans. Amer. Ent. Soc., LI, p. 99, 1925 (as a synonym of *A. parietum*).

Range.—*A. parietum* is indigenous in the entire Palearctic Region, being a common wasp throughout Europe (northward to 66° N. in Lapland), North Africa (as far south as the northern Sahara), Asia Minor, Central Asia, Siberia, North China, Manchuria and Korea. It has also been taken in the Azores and Madeira.[8]

In North America this wasp is a recent, accidental introduction by man, the earliest known capture dating from 1916. At present it is by no means rare in several localities of the eastern United States and Canada and seems to be spreading steadily. I have seen it from Quebec (Co. Kamour; Montreal, 1928, specimens recorded by Buckle, Canad. Entom., LXI, p. 266, 1929), Massachusetts, Rhode Island (Providence, 1925), New York (Pelham, 1928; Hamilton, 1932; New Rochelle, 1934; Niagara Falls; Buffalo), New Jersey, the District of Columbia (1926), Ohio (Columbus, 1930), and Michigan (Bay Co., 1924; Midland Co., 1936; East Lansing; Detroit). Other localities are given in the 1925 paper.

Color Pattern and Variation.—In Europe, *A. parietum* is claimed to be rather variable in color; but this may be due to its being confused frequently with closely related though structurally different species. Most of my Palearctic specimens are colored like those of North America, which I have described in detail in 1925. Only those from North China (Peiping) are distinctively colored and might perhaps be given a varietal or subspecific name; but I have found thus far no published name that could be applied to this form.

Habits.—There are many accounts of the life-history of *A. parietum* in the European literature; but the student should be warned that some of these are unreliable, being based on other species, misidentified as *parietum.* American observations were summarized in 1925. Stylopized specimens are by no means rare in Europe and have been taken in this country also (G. Salt, Psyche,

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[8] The supposed occurrence in West Africa (Dalla Torre, Gen. Insect., Vesp., p. 51, 1904) is erroneous.

XXXIV, p. 184, 1927; G. Salt and J. Bequaert, Psyche, XXXVI, p. 260, 1929). I have seen in addition a stylopized ♀ from Midland Co., Michigan (R. R. Dreisbach).

7. **Ancistrocerus neocallosus,** new species. Figs. 3A–E.

Medium-sized. Black marked with yellow. Sternite 2 vertically sloping and somewhat swollen at base, not furrowed lengthwise. Apical margins of all tergites flat.

Female.—Head seen in front about as high as wide; seen from above a little over twice as wide as long, slightly narrower than thorax; occipital margin slightly curved inward. Clypeus broadly pear-shaped, moderately convex, about as wide as high; apical margin narrowly truncate, scarcely curved inward, with broad blunt edges; free apical portion about as long as upper interocular part. Vertex near occiput with a mere trace of transverse flattening, bearing two minute foveae close to the middle line. Inner orbits about as far apart on vertex as at clypeus. Ocelli in a flattened triangle; hind ones about as far apart as from eyes. Interantennal area distinctly and sharply carinate longitudinally over lower half. Outer orbits somewhat swollen in upper portion, where they are distinctly narrower than eye in profile, margined behind by a sharp carina which continues behind vertex. Mandibles and antennae as in *A. catskillensis.* Thorax short rectangular seen from above, about one and one-third times as long as greatest width; in profile stubby, about one and one-third times as long as high. Humeral margin of pronotum nearly straight, its edge rounded off in the middle, faintly ridged toward the weak, blunt, squarish humeral angles; below these, sides of pronotum strongly rimmed throughout close to anterior margin. Scutellum and postscutellum moderately convex; scutellum with distinct longitudinal impressed line. Propodeum very short, almost vertically sloping; shallow median concavity poorly defined by very low and incomplete superior and inferior ridges; lateral angles well marked, but blunt, provided with a minute transverse carina which fades toward the rounded, rather bulging lateral ridges. Thorax otherwise, legs and wings (including venation) as in *A. catskillensis.* Abdomen short and stubby. Tergite 1 scarcely narrower than 2; suture moderately developed, complete, nearly straight; postsutural area two and one-half times as wide as greatest length. Tergite 2 a little wider than long; apical margin moderately thickened, opaque, scarcely raised, preceded by a slightly depressed area; base with a transverse row of large foveae, separated by strong riblets (normally covered by apex of tergite 1). Sternite 2 without longitudinal median furrow, vertically sloping at base behind the very narrow, foveolate transverse groove; edge of slope often somewhat swollen or followed by a slight flattening. Remainder of abdomen normal.

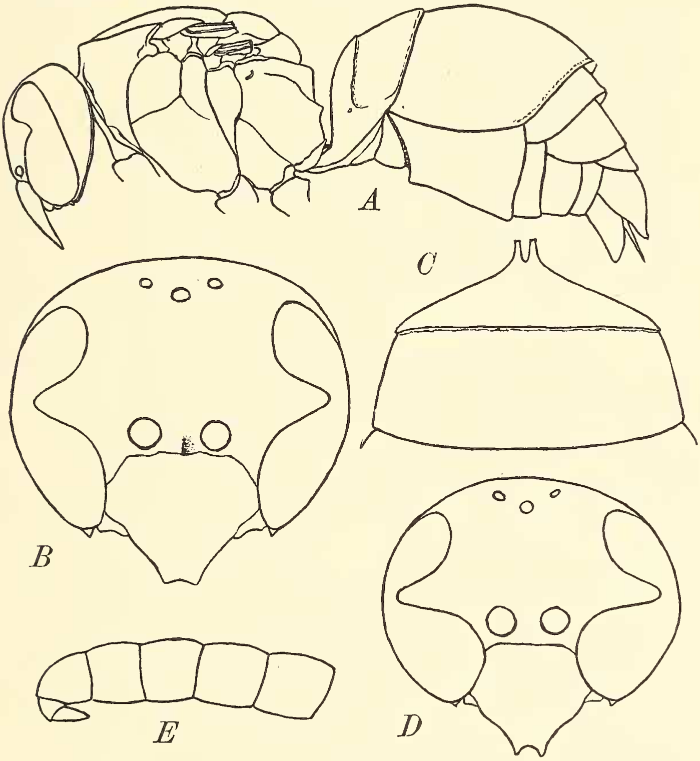

Fig. 3. *Ancistrocerus neocallosus* J. Bequaert, typical: A, ♀ holotype in profile; B, head of same in front view; C, tergite 1 of same from above; D, head of ♂ allotype in front view; E, tip of antenna of same.

Head and thorax very densely covered with medium-sized punctures, almost rugulose; punctures somewhat more spaced on clypeus, which has some irregular, longitudinal striae. Metapleura and adjoining sides of propodeum without punctures, but dull, microscopically striolate and alutaceous. Tegulae with few, very small punctures. Dorsal areas of propodeum reticulo-punctate; concavity microscopically striolate and with few scattering medium-sized punctures. Most of abdomen densely covered with medium-sized punctures (a little smaller than those of thorax), somewhat stronger over the preäpical areas of the tergites. Grayish-fulvous pubescence abundant and long over most of the body, particularly dense on frons.

Typical form black with the following sulphur-yellow markings: broad curved sides of clypeus (sometimes narrowly interrupted at lower third); a dot between antenna and inner orbit; a triangular spot at base of mandible; a spot in upper interantennal area; a streak on upper outer orbit; scape beneath; broad humeral margin of pronotum (dorsally); tegulae (except russet center); a spot on upper plate of mesepisternum; a crossband on scutellum (interrupted medially) and postscutellum (sometimes faint); small streaks at lateral angles of propodeum; broad apical fasciae on tergites 1 to 5 and sternites 2 to 5 (that of tergite 1 not widened at sides); usually a spot on tergite 6; and apices of femora (broadly on fore and mid, narrowly on hind legs). Flagellum black with pale dirty-russet blotches on under sides of 2 or 3 basal and 3 or 4 apical segments. Tarsi and usually most of tibiae russet (sometimes tibiae partly or mostly yellow). Wings subhyaline, often with an orange tinge, very slightly smoky and purplish in the radial cell; costa, subcosta and stigma russet; other veins brownish-black.

Length (h. + th. + t. 1 + 2): 8 to 9 mm.; of fore wing, 8.5 to 10 mm.

Male.—Readily associated with the ♀. Clypeus more regularly pentagonal in outline; apex with a deep, semi-elliptical notch and short triangular teeth. Eyes somewhat more bulging and farther apart on vertex than at clypeus; upper outer orbits only half as wide as eye in profile. Antennae as in related species; terminal hook short, slender, straight, pointed. Humeral angles more pronounced than in ♀, sharp but short. Clypeus with many very fine punctures, without striation. Preäpical area of tergite 2 more depressed and more coarsely punctate than in ♀.

Clypeus entirely yellow. Entire flagellum pale russet beneath. Yellow markings of postscutellum, mesepisternum and propodeum often lacking.

Length (h. + th. + t. 1 + 2): 5.5 to 7 mm.; of fore wing, 6 to 7.5 mm.

Range.—TEXAS: near El Paso, ♀ paratype (H. C. Fall).—NEW MEXICO: Dripping Spring, west base of Organ Mts., ♀ paratype (T. D. A. Cockerell).—KANSAS: Argus Mts., ♂ paratype (from V. V. Riley Collection); Hamilton Co., 3,350 ft., ♀ paratype (F. H. Snow).—COLORADO: Animas, La Plata Co., 6,600 ft., ♀ paratype (F. E. Lutz); Regnier, Baca Co., 4,500 ft., ♂ paratype (F. E. Lutz); Cornet Creek, Telluride, San Miguel Co., 9,300 ft., ♂ paratype (F. E. Lutz); Rock Creek near Colorado Springs, 9,000 ft., ♀ and ♂ paratypes; Keithley Road near Colorado Springs, 9,000 ft., ♂ paratypes (J. Bequaert); Tennessee Pass, Lake Co., 10,300 ft., ♀ paratype (F. E. Lutz).—ARIZONA: Mt. Lemmon, Sa. Catalina Mts., Pima Co., 6,000 ft., ♀ holotype, ♂ allotype and ♂ paratypes (J. Bequaert; J. C. Bradley); Webber's Cabin, Sa. Catalina Mts., Pima Co., 7,500 to 8,500 ft., ♂ paratype (J. C. Bradley); Huachuca Mts., Cochise Co., ♂ paratypes (F. X. Williams; R. M. Beamer); Jacob Lake, Coconino Co., 8,000 ft., ♀ and ♂ paratypes (R. M. Bohart); Oak Creek Canyon, Coconino Co., 4,000 to 5,000 ft., ♀ and ♂ paratypes (F. H. Snow; G. E. Bohart); Hermit Rim Road, Grand Canyon, Coconino Co., ♀ paratype (J. C. Bradley); Williams, Coconino Co., ♀ paratypes (H. S. Barber); San Francisco Mt. near Flagstaff, Coconino Co., 9,400 ft., ♀ and ♂ paratypes (F. E. Lutz; J. D. Beamer); Rustlers Park, Chiricahua Mts., Cochise Co., ♀ paratype (J. E. Beamer); Cochise Co., ♂ paratype (V. W. Owen); Grand Canyon, Coconino Co., 7,000 ft., ♀ paratypes (R. M. Bohart); base of Humphrey's Peak near Flagstaff, Coconino Co., 9,500 ft., ♂ paratypes (F. H. Snow).—UTAH: Eureka, Juab Co., ♀ paratype (T. Spaulding); Beaver Canyon, Beaver Co., ♀ and ♂ paratypes (G. P. Engelhardt).—NEVADA: Charleston Peak, Lincoln Co., 9,000 ft., ♂ paratype (R. M. Bohart).—CALIFORNIA: Mill Creek, San Bernardino Mts., San Bernardino Co., ♂ paratypes (C. D. Michener); Wolverton Creek, Sequoia National Park, Tulare Co., ♂ paratype (C. D. Michener); Needles, San Bernardino Co., ♂ paratypes (J. A. Kusche); Round Valley, San Jacinto Mts., Riverside Co., 9,200 ft., ♀ paratype (C. L. Remington); Altadena, Los Angeles Co., ♀ paratype (C. D. Michener); Darwin Falls, Inyo Co., ♀ paratype (R. M. Bohart); Acton, Los Angeles Co., at flowers of *Salix*, ♂ paratypes (E. G. Linsley); Tokopah Valley, Sequoia National Park, ♂ paratype (C. D. Michener); Santa Ana Canyon, San Bernardino Mts., San Bernardino Co., ♂ paratype (C. D. Michener).—The species should be looked for in the mountains of northern Mexico.—Holotype, allotype and paratypes at M.C.Z.; paratypes also at A.M.N.H., Phila.A.S., Cal.A.S., Corn.Un., U.S.N.M., Ks.Un., and in the collections of E. G. Linsley, C. D. Michener and R. M. Bohart.

Affinities.—*A. neocallosus* is the American representative of *A. nigricornis* (Curtis) (= *A. callosus* Thomson), a common wasp of the Palearctic Region, where it extends from the British Isles to the Island of Sakhalin and from Scandinavia and Finland to the shores of the Mediterranean. Although very similar in many respects, the two species appear to be structurally distinct. *A. neocallosus* is a stouter insect and has the base of sternite 2 more swollen. In *A. nigricornis* the preäpical area of tergite 2 is not depressed nor coarsely punctate, while most of the concavity of the propodeum is reticulo-punctate. The flagellum of the antenna is colored alike beneath in both species.

As *A. neocallosus* is fairly common in the southwestern United States, the possibility was considered that it might be one of the species described by Cameron. None of his descriptions, however, mentions the characteristic shape of sternite 2. Yet it is not impossible that the true type of *ormsbyensis* may have been a male of *neocallosus;* but the specimens labelled "*ormsbyensis*" in the Baker Collection at Pomona College are certainly not.

7a. **A. neocallosus** var. (or subsp.) **discopictus,** new.

Female and Male.—Differs from typical *neocallosus* only in the greater extension of the yellow markings on the abdomen, particularly in the presence of a yellow dot, spot or streak on each side of tergite 2. The size and shape of these spots vary; they are either free or connected with the apical fascia. In the ♀, clypeus and sides of propodeum also more extensively yellow; in the ♂, postscutellum and sides of propodeum sometimes with traces of yellow.

Range.—CALIFORNIA: Round Valley, San Jacinto Mts., Riverside Co., 9,200 ft., ♀ holotype and paratype (C. L. Remington); Pasadena, ♂ paratype (C. H. Hicks); Alta Meadow near Giant Forest, Tulare Co., ♂ allotype (W. M. Wheeler); Aroyo Seco, Los Angeles Co., ♀ and ♂ paratypes (C. D. Michener); Pinon Flat, San Jacinto Mts., Riverside Co., ♀ paratypes (E. S. Ross); mountains near Claremont, Los Angeles Co., ♂ paratype (C. F. Baker); Huntington Lake, Fresno Co., 7,000 ft., ♀ paratype (E. P. Van Duzee); San Jacinto Mts., Riverside Co., ♀ paratype (P. W. Oman); Wolverton Creek, Sequoia National Park, Tulare Co., ♂ paratype (C. D. Michener); Acton, Los Angeles Co., ♂ paratypes, at flowers of *Salix* (E. G. Linsley); Tuolumne Co., 3,500 ft., ♀ paratype (R. M. Bohart); Imperial Co., ♂ paratype (J. C. Bridwell).—ARIZONA: San Francisco Mt. near Flagstaff, Coconino Co., 9,400 ft., ♀ paratype (F. E. Lutz).—A ♀ paratype at U.S.N.M., without locality, was collected by E. J. Oslar and may have come from Nevada.—Holotype, allotype and paratypes at M.C.Z.; paratypes also at U.S.N.M., Cal.A.S., Corn.Un., A.M.N.H., and in the collections of E. G. Linsley, C. D. Michener and R. M. Bohart.

Remarks.—Typical *neocallosus* and the var. *discopictus* often occur in the same locality and possibly under the same ecological conditions. They are, moreover, connected by transitional specimens, with mere traces of dots on the disk of tergite 2, sometimes on one side only. It may, nevertheless, be useful to distinguish the variety by name, as it parallels similar color forms of other species of *Ancistrocerus* in the same area. As often happens in such cases, the profusely yellow form occupies only part of the range of the species, typical *neocallosus* having a wide range over the southwestern United States, while the var. *discopictus* is fairly common in California and rarely found elsewhere.

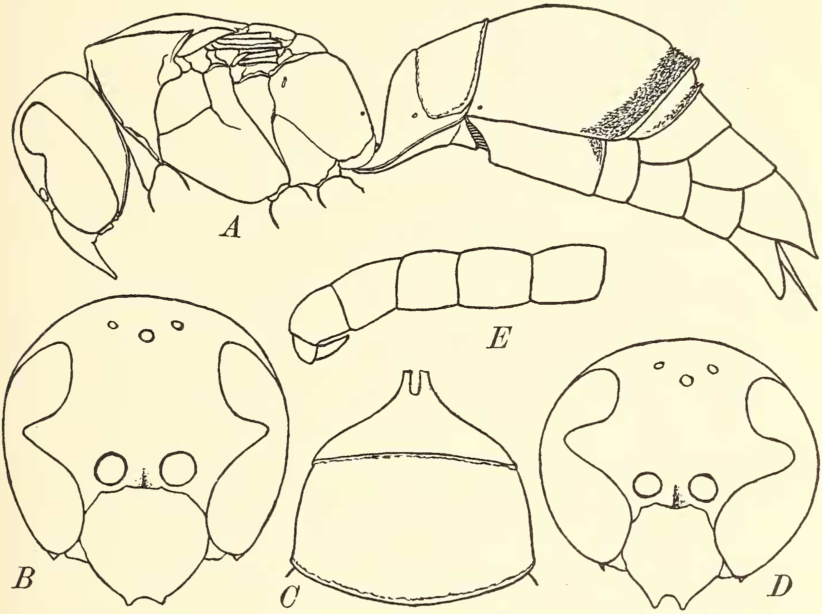

FIG. 4. *Ancistrocerus paracallosus* J. Bequaert: A, ♀ holotype in profile; B, head of same in front view; C, tergite 1 of same from above; D, head of ♂ allotype in front view; E, tip of antenna of same.

8. **Ancistrocerus paracallosus,** new species. Figs. 4A–E.

Medium-sized. Black, marked with yellow. Sternite 2 vertically sloping at base, not furrowed lengthwise. Tergites 2 and 3 with raised, collar-shaped apical margins.

Female.—Head slightly higher than wide seen in front; seen from above not fully twice as wide as long, slightly wider than thorax; occipital margin slightly curved inward. Clypeus broadly pear-shaped, moderately convex, about as wide as high; apical margin narrowly truncate, with short, blunt lateral teeth separated by a shallow emargination; free apical portion about as long as upper interocular part. Vertex near occiput with a slight, poorly defined, transverse flattened area, which bears two minute foveae close to the middle line. Inner orbits slightly farther apart on vertex than at clypeus. Ocelli in a flattened triangle; hind ones about as far apart as from eyes. Interantennal area with a distinct but short median carina above the clypeus. Outer orbits somewhat swollen in upper portion where they are nearly as wide as eye in profile, gradually narrowed below, margined behind by a sharp carina which continues behind the vertex. Mandibles and antennae as in *A. catskillensis.* Thorax elongate-rectangular seen from above, about one and three-fourths times as long as greatest width; in profile somewhat flattened dorsally, slightly over one and one-half times as long as high. Humeral margin of pronotum nearly straight, its edge rounded off in the middle, with traces of a fine ridge toward the faintly marked, blunt and squarish humeral angles; below these, sides of pronotum strongly rimmed throughout, close to anterior margin. Scutellum and postscutellum somewhat flattened. Propodeum rather short, moderately sloping; shallow median concavity poorly defined by very low and incomplete superior and inferior ridges; lateral angles obsolete; lateral ridges forming rounded shoulders. Thorax otherwise, legs and wings (including venation) as in *A. catskillensis.* Abdomen somewhat more elongate than in *A. catskillensis.* Tergite 1 scarcely narrower than 2; its suture moderately developed, nearly straight; postsutural area a little less than twice as wide as median length. Tergite 2 longer than wide; its apical margin abruptly raised into a vertical, collar-like, opaque ridge, preceded by a fairly broad, strongly depressed area. Apex of tergite 3 with a similar, but lower collar, which disappears before reaching the sides. Sternite 2 almost vertically sloping at base behind the finely ribbed transverse groove, without median longitudinal furrow; its apical margin slightly swollen at extreme sides. Apices of remaining tergites and sternites normal, flat.

Head and thorax densely covered with medium-sized punctures; their intervals on head with microscopic puncturation;

punctures somewhat smaller and farther apart on clypeus, lacking over most of metapleura and adjoining sides of propodeum, which are dull, microscopically striolate and alutaceous. Tegulae with few, very small punctures. Dorsal areas of propodeum reticulo-punctate; concavity microscopically striolate and with few scattering, medium-sized punctures. Most of abdomen with evenly scattered small punctures, the intervals microscopically punctulate. Preäpical depressed areas of tergites 2 and 3 very coarsely punctate, that of tergite 2 spiculate (intervals between punctures raised into irregular teeth; bottom of punctures somewhat translucent). Punctures of sternite 2 larger than those on base of tergite 2. Head, thorax and tergite 1 with rather abundant, long, erect, grayish pilosity; hairs much shorter on remainder of abdomen and legs.

Black, with the following sulphur-yellow markings: broad curved sides of clypeus; a dot between antenna and inner orbit; a dot on upper outer orbit; a triangular spot at base of mandible; a spot in upper interantennal area; scape beneath; broad humeral margin of pronotum (dorsally); tegulae (except russet center); most of upper plate of mesepisternum; a crossband on scutellum (interrupted medially) and postscutellum; broad apical fasciae on tergites 1 to 5 and sternites 2 to 5; a spot on tergite 6; apical portion of fore and mid femora; and all tibiae. Tip of mandible, base of flagellum beneath, and most of tarsi somewhat ferruginous (shading to yellow on tarsi). Wings subhyaline with yellowish-russet tinge, slightly smoky and violaceous in radial cell; stigma and veins russet.

Length (h. + th. + t. 1 + 2): 9.5 mm.; of fore wing, 9 mm.

Male.—Readily associated with the ♀. Clypeus more pentagonal with nearly equal sides, more deeply emarginate and with sharper teeth at apex. Eyes somewhat more bulging and farther apart on vertex than at clypeus; upper outer orbit much narrower than eye in profile. Antenna much as in *A. catskillensis;* terminal hook (segment 13) short, slender, straight, pointed. Humeral angles more pronounced, sharp but short. Apical collars of tergites 2 and 3 much higher than in ♀. Clypeus with many medium-sized punctures.

Clypeus entirely yellow. Only apical segments of flagellum pale russet either entirely or beneath.

Length (h. + th. + t. 1 + 2): 8 mm.; of fore wing, 8 mm.

Range.—South Dakota: Hot Springs, Fall River Co., ♀ holotype (H. C. Severin).—Arizona: Mt. Lemmon, Sa. Catalina Mts., Pima Co., 7,800 ft., ♂ allotype and paratype (J. Bequaert).—Holotype and allotype at M.C.Z.; paratype also in the collection of R. M. Bohart.

Affinities.—*A. paracallosus* has the abrupt basal declivity of sternite 2 found in the Old World *A. nigricornis* (Curtis) and the American *A. neocallosus,* but is well separated from either by the collar-like margins of tergites 2 and 3 and their spiculate preäpical areas. In addition the thorax is more elongate and more flattened above in *A. paracallosus.*

9. *Ancistrocerus antilope* (Panzer).

Range.—*A. antilope* occurs over most of the Palearctic and Nearctic Regions. It is known from a large part of Europe (including the British Isles), northward to far beyond the Arctic Circle (Kola, 69° N.), southward to northern Spain, northern Italy and across the Balkans to the Asiatic shore of the Sea of Marmara (Pendik). According to v. Schulthess it reaches the altitude of 2,000 meters (6,500 ft.) in the Swiss Alps. It probably ranges throughout Siberia, as there are records from the Altai and the island of Sakhalin.[9] In North America, it is truly indigenous and not an introduction by man within historic times, as proved by its having produced there several precinctive color forms. Here it does not, however, extend as far north as in the Old World, being known in the east from southern Newfoundland (about 48° N.), but not from Labrador, and in the west from southern British Columbia (about 51° N.). It covers nearly the entire United States (with the possible exception of the extreme southeastern corner); but there are as yet no records from Mexico.

Structural Characters and Affinities.—*A. antilope* is our largest *Ancistrocerus,* the fore wing being 9.5 to 13 mm. long in the ♀, 7.5 to 10.5 mm. in the ♂. The species is somewhat isolated in the genus, as shown particularly by the unusual male terminalia. Their most striking peculiarity is the deeply bifid aedeagus, which was figured by L. Moczár (Festschrift E. Strand, IV, p. 610, Pl. IX, figs. 116–117, 1938) from a European specimen, while my Figs. 2H–J are drawn from an American ♂. As no reliable structural difference could be detected between European *antilope* and American *capra,*

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[9] There are no reliable records from North Africa or any other part of Africa; and the supposed occurrence in the Canary Islands or the East Indies (de Saussure, Et. Fam. Vesp., III, p. 205, 1855) is certainly erroneous.

I propose synonymizing the latter with the former. The hind half of the mesonotum and the scutellum are flattened in this species.

Color Pattern and Variation.—In Europe, *A. antilope* varies in color within rather narrow limits and has produced no forms worth naming. Possibly Asiatic specimens, which I have not seen, might be more aberrant. In North America, however, the range of variation is much wider, four forms being fairly well marked, as shown below. One of them is identical with the typical European form.

1. Pale markings white or creamy-white. Tergite 2 with only the apical fascia pale, its preäpical area not coarsely punctate .... var. *spenceri.*
   Pale markings yellow or orange-yellow .... 2.
2. Preäpical area of tergite 2 roughly and densely punctate. Wings purplish-gray. Tergite 2 with apical fascia only. Pale markings more or less orange-yellow .... var. *navajo.*
   Preäpical area of tergite 2 not coarsely punctate. Pale markings lemon-yellow .... 3.
3. Yellow markings extensive; spots of scutellum large; tergite 2 with lateral discal spots, either free or connected with apical fascia; fascia of tergite 1 widened at the sides; wings tinged with amber-yellow .... var. *allegrus.*
   Yellow markings moderate; spots of scutellum small; tergite 2 with apical fascia only; wings slightly grayish or somewhat infuscate .... typical *antilope.*

In all color forms of *A. antilope* the under side of the flagellum is broadly dirty fulvous-yellow throughout its length in both sexes, only the twelfth segment of the ♀ being entirely black.

9*a*. Typical *A. antilope.* Figs. 2H–J.

Vespa antilope Panzer, Fauna Insect. Germaniae, V, pt. 53, Pl. IX, with letterpress, 1798 (♀; Austria).

Odynerus capra H. de Saussure, Rev. Mag. Zool., (2) IX, p. 273, 1857 (no sex; United States and Canada).

Ancistrocerus capra H. de Saussure, Smithson. Misc. Coll., No. 254, p. 163, 1875 (♀♂; Canada; Lake Superior; Connecticut; Pennsylvania; Tennessee; Illinois; Missouri; Louisiana.—Connecticut is herewith designated as the type locality).

Ancistrocerus nearcticus Cameron, Trans. Amer. Ent. Soc., XXXII, p. 332, 1906 (♂; Wilmerding, Pennsylvania).

Ancistrocerus lecontei Cameron, Trans. Amer. Ent. Soc., XXXIV, p. 218, 1908 (♀♂; Ormsby Co., Nevada, selected as type locality in my 1925 paper; also Berkeley and Golden, Colorado).

Range.—Typical *A. antilope* occurs over most of the United States and southern Canada and has been taken at altitudes up to 7,000 ft. I have seen it from Newfoundland (Spruce Brook; Cape Ray), New Brunswick (Red Head, St. John), Quebec (Val Morin; Joliette; Rigaud; Montréal), Ontario (Bobcaygeon; Toronto), Nova Scotia, Maine, New Hampshire, Massachusetts, Vermont, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, West Virginia, Georgia (Rabun Bald; Neel Gap), Ohio, Indiana, Illinois, Michigan, Wisconsin, Missouri, Nebraska, Kansas (Onaga), Minnesota, Iowa (Mt. Pleasant), South Dakota (Harney Peak; Big Stone; Spearfish), Colorado, New Mexico (Little Tesuque Canyon near Santa Fé, 9,200 ft.), Utah (Beaver Canyon), Wyoming, Idaho, Montana, California (Sierra Nevada and central to northern coast ranges), Oregon, the State of Washington (Mt. Rainier; Republic), Alberta (Fran River; Wabimun), and British Columbia (Hope; Kaslo; Ainsworth; Kamloops; Salmon Arm; Cowichan Lake). There are also published records from Tennessee, Louisiana and Nevada; but the species possibly does not occur in Florida and Alabama. In the Old World the distribution of the typical form coincides with that of the species. Prince Edward Island (Brackley Beach, Can. Nat. Pk.) and Manitoba (Winnipeg; Teulon; Aweme) may be added to the range.

Synonymy.—Names based on Palearctic specimens are not included in my synonymy. At my request, Mr. Soika compared North American specimens of *A. antilope* ("*capra*") with what appears to be the true type of *A. lecontei* Cameron and he concluded that they were the same color form of the species. The whereabouts of the type of *A. nearcticus* is not known; but it was evidently a male of *antilope,* as shown by the statement: "The metanotal areae are only punctured round the edges." (Cameron generally called the propodeum, "metanotum.")

Color Pattern and Variation.—Typical *A. antilope,* described by Panzer, had apical yellow fasciae only on tergites 1 to 4 (not widened on the sides of tergite 1), no spot on tergite 6 of ♀, the scutellum with two yellow spots and the clypeus with four spots. Such specimens are common in North and Central Europe; but in the more southern areas segments 1 to 5 may have fasciae and tergite

6 a spot, while the fascia of tergite 1 is sometimes widened laterally. Wesmael even described from Europe an aberrant ♂ with a pair of discal yellow spots on tergite 2, as is the rule in the North American var. *allegrus*. On the other hand, in Northern Europe the yellow markings are often reduced. All these variations seem too trifling for defining named varieties or races. I have not seen Asiatic specimens and their pattern has not been described. North American specimens of typical *antilope* are a uniform lot, most of them agreeing well with Panzer's original figure. As a rule, the fascia of tergite 1 is narrow throughout and tergite 6 of the ♀ lacks the preäpical spot. The latter, as well as the widened fascia of tergite 1, are sometimes found in specimens from Colorado, which seem to be transitional to var. *allegrus*.

Habits.—The Peckhams' observations mentioned in my 1925 paper, were reproduced in their later work (Wasps Social and Solitary, pp. 92–94, 1905). The following are additional accounts of the habits in America. P. Rau (Trans. Ac. Sci. St. Louis, XXV, p. 405, 1928) describes a nest placed in a sumac twig, near St. Louis, Missouri. E. G. Reinhard (The Witchery of Wasps, pp. 86–91, 1929) has a lengthy account of the nesting habits in the eastern United States.[10] J. W. Buckle (Canad. Entom., LXI, pp. 265–266, 1929) describes how this wasp gathers caterpillars of the silver-spotted skipper (*Epargyreus tityrus* Fabricius), in Quebec. The habits of *A. antilope* have been studied often in Europe, but some of the published accounts credited to this wasp are plainly based on misidentifications. I have seen no stylopized specimens and none have been reported thus far (Pierce's supposed stylopized *capra* was *A. catskillensis* var. *albophaleratus*). The adults are, however, often parasitized by mites, which cover the concavity and sides of the propodeum and sometimes invade the interior of the seventh abdominal segment of the ♂.

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[10] There is no real evidence that *A. antilope* ever builds free mud-nests, although it may adapt to its own use abandoned mud-nests built by other wasps. E. Strand (Ent. Mitt., Berlin-Dahlem, III, p 116, 1914), having received from North America specimens of both *A. capra* and *A. birenimaculatus* together with free mud-nests, surmised that both species built such nests, although he stated that the one nest he figured was the work of *A. birenimaculatus*. Unfortunately, the error was taken over and made more definite in H. Bischoff's otherwise excellent treatise "Die Biologie der Hymenopteren" (p. 217, 1927). It is to be feared that it will now be difficult to eradicate the mistake.

9*b*. *A. antilope* var. (or subsp.) **allegrus,** new.

Female.—Much more extensively marked with bright yellow than typical *A. antilope.* Spots on clypeus, pronotum and scutellum large; postscutellum sometimes spotted or the hind margin of the pronotum yellow. Apical yellow fasciae of tergites and sternites very broad; tergite 2 as a rule with a spot on each side of the disk, the spots connected with or narrowly divided from the apical fascia; sternite 2 often extensively yellow; tergite 6 with yellow spot. Wings tinged with honey-yellow; costa and stigma somewhat russet. Concavity of propodeum often more extensively smooth than in typical *antilope.* The most xanthic specimen seen is a ♀ from Shasta Co., California, in which the abdomen is yellow except for an hourglass-shaped black mark at the base of tergite 2, as well as the black base and a rectangular postsutural spot on tergite 1. In Colorado some specimens are transitional to typical *antilope,* having amber-yellow wings, but no discal spots on tergite 2; while in Arizona there are passages to var. *navajo.*

Male.—Similar to the ♀. Discal spots of tergite 2 usually smaller, sometimes barely indicated.

Range.—California: Upper Lake, Lake Co., ♂ allotype (R. M. Bohart); Indian Flat, Mariposa Co., ♂ paratype (R. M. Bohart); Bass Lake, Madera Co., ♂ paratype (R. M. Bohart); Mt. Diablo, Contra Costa Co., ♂ paratype (R. M. Bohart); Shasta Co., ♀ paratype; Keddie, Plumas Co., ♂ paratype (M. Cazier and T. Aitken); Cloverdale, Sonoma Co., ♀ paratype; Siskiyou Co., ♂ paratype (J. C. Bridwell); Los Angeles Co., ♂ paratype (Coquillett).—Oregon: Corvallis, ♀ holotype; Forest Grove, ♀ paratype (G. Ferguson).—Colorado: Denver, ♂ paratype (A. Johnson); Boulder, ♂ paratype (H. B. James).—Holotype and paratypes at M.C.Z.; allotype and paratypes in R. M. Bohart Collection; paratypes also in U.S.N.M., A.M.N.H., and Or.St.C.

9*c*. *A. antilope* var. *navajo* J. Bequaert.

Ancistrocerus navajo J. Bequaert, Trans. Amer. Ent. Soc., LI, p. 92, 1925 (♀♂; Post Creek Canyon, Pinaleño Mts., Arizona, type locality; also other localities in Arizona, New Mexico, Colorado, Montana, and California).

Synonymy.—A study of more extensive material of *A. antilope* from the Rocky Mountains and the Pacific Coast area has convinced me that *navajo* is no more than an extreme variant of this species. The holotype and allotype are at the Phila.A.S.; paratypes at M.C.Z. and Corn.Un.

Range.—The var. *navajo* seems to be peculiar to the Upper Sonoran life-zone. I have seen it from Colorado (Clear Creek), Montana, California, Arizona and New Mexico.

Color Pattern and Variation.—The most typical specimens of *navajo* have the markings decidedly orange-yellow, being homeochromic with some other Upper Sonoran wasps (*Polistes canadensis* var. *navajoe* Cresson and *Mischocyttarus flavitarsis* var. *navajo* J. Bequaert); all passages occur, however, both in color and sculpture, between such specimens and others which are clearly var. *allegrus.*

10*d*. *A. antilope* var. (or subsp.) **spenceri,** new.

Female.—Black, with the following markings either pure white or creamy-white: two small spots in upper half of clypeus (sometimes absent); a spot on frons above insertions of antennae; a spot on base of mandible; under side of scape; broad humeral margin of pronotum (interrupted medially); a small spot on upper sclerite of mesopleuron; two dots on tegula; moderately wide apical fasciae on abdominal tergites 1 to 5 (restricted to the middle or lacking on the fifth) and sternites 2 to 4 (restricted to the side corners on the fourth); apices of femora and most of outer side of tibiae. Flagellum with a russet-yellow streak beneath; inner side of fore tibiae, tarsal claws and tibial spurs russet. Wings tinged with grayish, slightly yellowish anteriorly and somewhat violaceous in the radial cell. The markings are less extensive than in most typical *antilope.*

Range.—British Columbia: Kamloops, ♀ holotype and paratypes (G. J. Spencer); Swansea Mt., ♀ paratype (E. G. Marples); Terrace, ♀ paratype (M. E. Hippisley).—Holotype at M.C.Z.; paratypes at Un.B.C., U.S.N.M., and in R. M. Bohart Collection. An additional ♀ paratype, at Can. Agr. Ent., is from Lillooet, British Columbia. I have also seen a ♂ allotype, at Can. Agr. Ent., from Hazelton, British Columbia (W. B. Anderson). It is colored like the ♀, but the clypeus is entirely white.

A ♀ of *A. antilope* from Lac St. Jean, Quebec, also has whitish markings; but they appear to be faded and were probably yellow in life. The British Columbia specimens are in very fresh condition; those from Kamloops were taken together with typical *antilope,* distinctly marked with yellow.

10. *Ancistrocerus spinolae* (de Saussure).

Odynerus (*Ancistrocerus*) *spinolae* H. de Saussure, Et. Fam. Vesp., III, p. 216, 1855 (no sex, but probably ♀; Philadelphia, Pennsylvania).

Range.—*A. spinolae* is a rare species, seemingly restricted to the eastern United States. I have seen it from New York, New Jersey (Belle Plain Fire Station), Pennsylvania (Winona Falls), Virginia, North Carolina (Great Smokies National Park), South Carolina (Dewees Id.), Georgia, Florida (Lake Harris), Texas, Kentucky, Missouri (Kirkwood), Ohio (Franklin Co.), Illinois (Urbana) and Michigan. It has also been recorded from Connecticut, Indiana and Tennessee.

Structural Characters and Affinities.—*A. spinolae* is very closely related to *A. antilope.* Apart from the difference in sculpture of the propodeum, there is little to differentiate between the two. Unfortunately I am unable to compare the ♂ terminalia, the only known ♂ being unavailable for dissection. The species has no known representative in the Old World.

Color Pattern and Variation.—As pointed out in 1925, the color pattern is distinctive, not being found in any of the forms of *A. antilope.* It varies relatively little; but the apical fascia of tergite 2 is often much reduced or even lacking. In both sexes the flagellum beneath is fulvous-yellow, except on segment 12 of the ♀.

Habits.—The nesting habits of *A. spinolae* are as yet unknown. I have seen a stylopized ♀ from Great Smokies National Park, a ♀ parasite protruding from beneath the hind margin of tergite 3; its presence did not affect the morphology or color of the wasp.

11. *Ancistrocerus campestris* (de Saussure).

Odynerus (*Ancistrocerus*) *campestris* H. de Saussure, Et. Fam. Vesp., I, p. 137, 1853 (♀; Carolina); *Ibid.,* III, p. 204, 1855 (♂; Florida).

Range.—*A. campestris* is widely distributed over North America east of the Rocky Mountains, but is one of the less common species. I have seen it from eastern Ontario (without more definite locality), New Hampshire (Squam Lake; North Conway), Massachusetts, Connecticut, New York, New Jersey, Pennsylvania (Philadelphia; West Chester; Roberts P. O.; State College), Delaware, Maryland, the District of Columbia, Virginia, West Virginia (Morgantown), North Carolina, Georgia, Florida (De Funiak Springs; Lake City; Crestview), Alabama (Mobile; Auburn), Kentucky (Lexington), Ohio, Michigan (Massaukee Co.), Indiana (Vincennes), Illinois, Wisconsin (Washington Co.), Minnesota (Olmsted Co.), South Dakota (Big Stone), Kansas (Riley Co.), Missouri (2 miles W. of St. Louis), Oklahoma (Quinton), and Texas (Brazos Co.; San Gabriel River; Waterloo).

Structural Characters and Affinities.—This species is very close to the western *A. lineativentris,* which I considered at one time to be only one of its color forms. All specimens seen of both species are, however, readily separated by the characters given in the key. The areas of these two species are not known to overlap.

Color Pattern and Variation.—*A. campestris* is known only in one color form. Normally the abdomen has apical yellow fasciae on tergites 1 to 3, that of the first abruptly widened at the sides. Very rarely there may be a small yellow spot on each side of the disk of tergite 2; but this variant occurs sporadically over the entire range of the species, hence does not seem to call for a special varietal name.

Habits.—The nesting habits are unknown. Pierce recorded a stylopized specimen (G. Salt and J. Bequaert, Psyche, XXXVI, p. 259, 1929).

12. *Ancistrocerus lineativentris* Cameron.

Range.—*A. lineativentris* replaces *A. campestris* in western North America, where it occurs throughout the Rocky Mountains and on the Pacific Coast, from southern British Columbia to northern Mexico (Chihuahua), eastward as far as Kansas and New Mexico.

Structural Characters and Affinities.—See under *A. campestris.* Both species have the preäpical area of tergite 2 somewhat deepened and coarsely punctate, but this character is very variable even in the same locality. Sometimes the area is deeply channelled and more or less aciculate, or the apical margin may be only slightly raised. The depression is usually more pronounced in the ♂ than in the ♀.

Color Pattern and Variation.—*A. lineativentris* is very variable in the extent of the yellow markings, the body being sometimes also in part reddish. I recognize three color forms by name, as shown in the subjoined key. These forms are fairly well segregated geographically, though overlapping in certain areas.

1. Body black, marked with yellow and in addition more or less blotched with orange-red or rufous, at least on tergite 1. Disk of tergite 2 more or less yellow or orange before the apical yellow fascia .... var. *fulvicarpus.*
   Body black, marked with yellow only .... 2.
2. Tergite 2 with more or less extensive discal yellow spots in addition to the yellow apical fascia, with which the spots are sometimes connected on the sides .... typical *lineativentris.*
   Tergite 2 with yellow apical fascia only .... var. *kamloopsensis.*

12*a*. Typical *A. lineativentris.*

Ancistrocerus lineativentris Cameron, Invertebrata Pacifica, I, p. 146, 1906 (♂; mountains near Claremont, California).

Range.—Typical *lineativentris* is fairly common throughout California, including Catalina Island. I have also seen it from Nevada (Charleston Mt. Park), Colorado (Cimarron; Jim Creek near Boulder; Cedaredge), Montana (Silver Bow), Oregon (Mt. Lookout Trail, Grant Co., 5,200 to 6,000 ft.; Jacobs Cabin, Hart Mt., Lake Co., 6,600 ft.; Canyon City; Corvallis; etc.), the State of Washington (Pullman; Wawawai), Idaho (Gibbonsville, Lemhi Co.), southern Arizona (Huachuca Mts.), New Mexico (Jemez Springs), and western Kansas (La Cumbre). The allotype here selected is a ♀ from Huachuca Mts., Arizona, at the M.C.Z. Typical *lineativentris* is the unnamed form mentioned in my 1925 paper following the discussion of *A. compestris* (p. 87). It also occurs in British Columbia (Vernon; Oliver; Okanagan Falls; Summerland).

Color Pattern and Variation.—In some specimens the discal spots of tergite 2 are very large, almost running together medially; in others they dwindle to minute dots. Tergite 1 also sometimes bears discal side spots. In Colorado and New Mexico typical *lineativentris* intergrades with the var. *fulvicarpus,* some of the yellow markings turning orange, and in Oregon with var. *kamloopsensis.* In some localities two of the forms of the species may occur side by side.

12*b*. *A. lineativentris* var. (or subsp.) **kamloopsensis,** new.

Female.—Yellow markings more reduced than in typical *lineativentris,* as follows: four small spots on clypeus; a frontal spot above antennae; a spot on upper outer orbit; a spot on base of mandible; under side of scape; humeral margin of pronotum; outer margin of tegula; spot in upper part of the mesopleuron; dots on scutellum; interrupted cross-band on postscutellum; apices of femora; most of tibiae and tarsi (the latter somewhat russet); apical fasciae of tergites 1 to 5 and of sternites 2 to 5; and a small spot on tergite 6. Apex of mandible ferruginous. Wings grayish with a slight yellowish tinge; stigma russet.

Male.—Similar to the ♀. Clypeus entirely and femora more extensively yellow.

Range.—BRITISH COLUMBIA: Kamloops, ♀ holotype (G. J. Spencer).—OREGON: Cornucopia, Baker Co., 7,100 ft., ♂ allotype

(R. E. Rieder); Queen Mine above Cornucopia, Baker Co., 5,000 ft., ♂ paratype; Fall on Mt. Lookout Trail, Grant Co., 5,200 to 6,000 ft., ♂ paratype; 9 miles S. of Baker, Baker Co., 4,250 ft., ♂ paratype, at flowers of *Solidago* (H. A. Scullen).—WYOMING: Yellowstone National Park, ♂ paratype.—Holotype and allotype at M.C.Z.; paratypes in A.M.N.H. and Or.St.C. This is the northernmost form of the species and should be looked for in parts of the State of Washington. I have seen an additional ♂ paratype, at Can. Agr. Ent., from Okanagan Falls, British Columbia (F. W. L. Sladen).

12*c*. *A. lineativentris* var. *fulvicarpus* Cameron.

Ancistrocerus fulvicarpus Cameron, Trans. Amer. Ent. Soc., XXXIV, p. 222, 1908 (♀; southwestern Colorado).

Range.—I have seen the var. *fulvicarpus* from Colorado (Florissant, at flowers of *Edwinia americana* A. A. Heller; Denver; Willow Creek; Cimarron; Clear Creek, Jefferson Co.; Montezuma Co.), Utah (Consumers), New Mexico (Des Moines; Mountain Park; Magdalena Mts.), Oklahoma (Kenton), Arizona (Santa Rita Mts., 5,000 to 8,000 ft.; Huachuca Mts.; Chiricahua Mts.; Williams, Coconino Co.; Mud Springs, Sa. Catalina Mts., 6,500 ft.; Oak Creek Canyon, Coconino Co.), and northern Mexico (Meadow Valley, Chihuahua).—The allotype here selected is a ♂ from Kenton, Oklahoma, at the M.C.Z. It is the only form of the species known at present from Mexico. I mentioned it in 1925, in the discussion of *A. tuberculiceps* (p. 86).

Color Pattern and Variation.—Some ♀ have a pair of short longitudinal yellow or orange stripes on the mesonotum. The var. *fulvicarpus* is homeochromic with the typical form of *A. tuberculiceps*, which often occurs in the same locality and is frequently confused with it. The known range of *A. tuberculiceps* is, however, much more extensive than that of *fulvicarpus*.

13. *Ancistrocerus unifasciatus* (de Saussure).

Range.—*A. unifasciatus* is a characteristic wasp of the eastern half of the United States, extending westward to about the 100th Meridian. In Canada it is known only from southern Quebec and Southern Ontario; it does not reach the Valley of the Rio Grande in Texas.

Structural Characters and Affinities.—*A. unifasciatus* is closely related to both *A. campestris* and *A. lineativentris*.

Color Pattern and Variation.—The yellow markings are usually much reduced in this species, but the number of tergites bearing an apical fascia varies. Often only tergite 1 has a fascia, widened laterally or edged with russet, in the ♀. In the ♂ there may be fasciae on tergites 1 and 2, or on 1 to 3, or also on some of the succeeding tergites. These variations seem to be part of the same population; but in Florida there is a peculiar color form worth naming.

1. Body mainly black and lemon-yellow, either without russet or somewhat reddish on tergite 1; no reddish on tergite 2; yellow fascia of tergite 1 as a rule much widened on the sides .... typical *unifasciatus*.
   Most of the pale markings of the otherwise black body reddish or orange; postsutural area of tergite 1 mostly red, with a uniformly narrow apical yellow fascia; tergite 2 with lateral reddish spots .... var. *seminole*.

13*a*. Typical *A. unifasciatus*.

Odynerus uncinatus "Fabricius" Say, Boston Journ. Nat. Hist., I, p. 386, 1837 (♀; Indiana). Not *Vespa uncinata* Fabricius, 1775.

Odynerus (*Ancistrocerus*) *unifasciatus* H. de Saussure, Et. Fam. Vesp., I, p. 138, 1853 (♀; Carolina).

Range.—Typical *unifasciatus* occurs over the entire area of the species. I have seen it from Quebec (Montreal; Berthierville; Rigaud; La Trappe), Maine (Hancock; Paris), New Hampshire, Vermont, Massachusetts (Reading, at flowers of *Ceanothus americanus* Linné), Connecticut, New York, New Jersey, Pennsylvania, Maryland, Virginia, West Virginia (Monongalia Co.), North Carolina, Georgia, Florida (Jacksonville), Tennessee (Hurricane Mills), Ohio, Illinois, Michigan (Pentwater; Deerfield), Missouri (St. Louis), Kansas (Baldwin), and Texas (Fedor, Lee Co.; Kerrville, Kerr Co.). It has also been recorded from Iowa and Indiana. I have recently seen specimens from Ontario (Toronto; Jordan; Port Hope; Ottawa; Grimsby; Simcoe; Hasting's Co.; Trenton).

Habits.—An illustrated account of the nesting habits of *A. unifasciatus* near Stamford, Connecticut, was published by P. G. Howes (Backyard Exploration, pp. 96–100, figs. 100–105, 1927). P. Rau observed the sleeping habits in captivity (Ann. Ent. Soc. America, XXXI, p. 543, 1938) and noted a ♀ collecting mud for nesting purposes (Trans. Ac. Sci. St. Louis, XXV, p. 211, 1926).

13*b*. *A. unifasciatus* var. (or subsp.) **seminole**, new.

Female.—Black. Under side of scape and flagellum, most of mandibles, three spots on clypeus, a spot above antennae and one between antenna and eye, a streak on upper outer orbit, humeral margin of pronotum (widened medially), tegulae, a spot on upper mesopleuron, postscutellum, tibiae, tarsi and apices of femora, orange-yellow to ferruginous. Postsutural area of tergite 1 mostly, and antero-lateral spots on tergite and sternite 2 ferruginous to brick-red. Apical margins of tergite 1 and of tergite and sternite 2 narrowly yellow. Wings black, strongly violaceous.

Range.—Florida: Greenville, Madison Co., ♀ holotype and paratypes, May 14, 1935 (Graham B. Fairchild). Holotype and paratypes at M.C.Z.; paratypes also in R. M. Bohart Collection, at U.S.N.M. and at A.M.N.H.

14. *Ancistrocerus tuberculiceps* (de Saussure).

Range.—*A. tuberculiceps* is one of the more common wasps throughout the western half of the United States. It extends into southern British Columbia, as well as over the more temperate portions of Mexico as far south as the Isthmus of Tehuantepec.

Structural Characters and Affinities.—This species does not appear to have any very close relatives either in the Nearctic or in the Neotropical Regions, although it belongs to the group of *A. unifasciatus.* In 1925 I treated *tuberculiceps* and *sutterianus* as two distinct species. A study of abundant material, collected over a wide area, has convinced Dr. Bohart and myself that the supposed structural differences vary to such an extent in the same population, as to be wholly unreliable. This applies particularly to the size of the shiny tubercle of the vertex, which, moreover, is always more pronounced in the male.

Color Pattern and Variation.—*A. tuberculiceps* occurs in two well-marked color forms, one of which (*sutterianus*) is typical of the Pacific Coast area, while the other occupies the Rocky Mountains and the highlands of Mexico. Both forms, as well as transitional specimens, are found in Utah.

1. Extensively marked with ferruginous-red to orange; abdomen mostly orange-red, the segments with yellow apical fasciae. Wings more or less violaceous .... typical *tuberculiceps.*

Extensively marked with lemon-yellow; usually only antennae and legs partly reddish. Wings more or less tinged with yellow .... var. *sutterianus.*

14*a*. Typical *A. tuberculiceps.*

Odynerus (*Ancistrocerus*) *tuberculocephalus* H. de Saussure, Et. Fam. Vesp., I, p. 139, Pl. XVI, fig. 9, 1853 (♀♂; Mexico).

Odynerus (*Ancistrocerus*) *tuberculiceps* H. de Saussure, Et. Fam. Vesp., I, in Errata issued with title-page and Table of Contents, 1853 (author's emendation).

Odynerus nigrohirsutulus "Cameron" J. Bequaert, Trans. Amer. Ent. Soc., LI, p. 114, 1925 (as a synonym of *A. tuberculocephalus*).

Range.—The typical form of *A. tuberculiceps* is a characteristic wasp of the Rocky Mountains and the temperate regions of Mexico. I have seen it from South Dakota (Hot Springs), Wyoming (Green River), Idaho (Warren, Idaho Co.; Lewiston, Nez Perce Co.), Utah (Green River, Emery Co.; Beaver Valley, Beaver Co.; Logan; Fort Douglas), Colorado (Vine Creek, Boulder Co., at flowers of *Eriogonum effusum* Nuttall), New Mexico (Las Vegas; Beulah), Arizona (common), western Texas (Chisos Mts. and Big Bend Park, Brewster Co.), and Mexico (Morelia, Michoacan; Guadalajara, Jalisco; Jacala, Hidalgo; Meadow Valley, Chihuahua; Atzcapolzalco, D. F.; Mexico, D. F.). In 1875 de Saussure gave the distribution as follows: "The temperate regions and the plateau of Mexico.[11] I have found this *Odynerus* common in the most various localities. In the eastern Cordillera, in the valleys of Orizaba [Vera Cruz] and of Jalapa [Vera Cruz], of Uvero [?State]; in the Sierra Madre; in the valley of Mextitlan [Hidalgo]; in Huasteca [?State] on the Pacific slope, and in the province of Mechoacan [=Michoacan] about Morelia, Tuxpan, Zinapecuaro, Patzcuaro, and finally on the plateau in the valley of Mexico." This wasp should be looked for in Montana.

Color Pattern and Variation.—The ♀ usually bears a yellow streak on each side of the vertex, along the upper inner orbit, and sometimes more or less developed orange-yellow longitudinal stripes on the mesonotum.

Habits.—P. Rau (Ann. Ent. Soc. America, XXXIII, p. 593, 1940) observed *A. tuberculiceps* in Mexico nesting in old pipe-organ mud-nests previously built by a *Trypoxylon.* No stylopized specimens have as yet been reported.

14*b*. *A. tuberculiceps* var. *sutterianus* de Saussure.

Ancistrocerus sutterianus H. de Saussure, Smithson. Misc. Coll., No. 254, p. 186, 1875 (♀♂; California).

Ancistrocerus sutteranus Cameron, Invertebrata Pacifica, I, p. 123, 1905 (misspelling of *sutterianus*).

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[11] I have inserted the name of the State in brackets, so far as I was able to trace it.

Range.—The var. *sutterianus* is almost restricted to the Pacific Coast states, where it occurs from sea-level to altitudes of about 4,500 ft. I have seen it from southern British Columbia (Vernon), Oregon (widely distributed), California (widely distributed), Nevada (Ormsby Co.) and Utah (Salt Lake City; Stockton; Lagoon). It should be looked for in the State of Washington. The specimen from Idaho listed under *sutterianus* in 1925, I now place under typical *tuberculiceps.*

Habits.—A series of 9 ♂ were bred by Mr. H. W. Prescott from an old mud-nest of *Sceliphron caementarium* Drury, collected at Ashland, Oregon, showing that the nesting habits of the var. *sutterianus* do not differ from those of typical *tuberculiceps.*

15. *Ancistrocerus parredesi* (de Saussure). Figs. 2K–M.

Odynerus (*Ancistrocerus*) *parredes* H. de Saussure, Rev. Mag. Zool., (2) IX, p. 273, 1857 (no sex; Mextitlan, State of Hidalgo, Mexico).

Ancistrocerus parredesi H. de Saussure, Smithson. Miscell. Coll., No. 254, p. 180, 1875 (♀; author's emendation).

Range.—Arizona: Huachuca Mts., ♂, June 1920 (F. X. Williams.—Cal.A.S.).—Mexico: Oaxaca, State of Oaxaca, ♂ allotype (Crawford).—Republic of Honduras: Rosario, San Juacinto Mts., 5,150 ft., ♀.—Costa Rica: La Fuente, ♀ (A. Alfaro).—Republic of Panama: Boquete, Chiriqui Province, ♀ (G. B. Fairchild); Cerro Punta, ♀.

Structural Characters and Affinities.—The following additional characters are not mentioned in the key. Interocellar area with a shallow longitudinal groove, separating two low, coarsely punctate ridges, equally developed in both sexes. Humeral angles short, triangular, somewhat sharper in ♂ than in ♀. Transverse suture of tergite 1 unusually well marked, forming a sharp, slightly wavy carina; postsutural area narrower in ♂ than in ♀; in ♂ about twice as broad at suture as long in the middle; in ♀ over twice as broad. Lateral angles of propodeum forming short but distinct teeth in ♂, almost rounded off in ♀; superior ridges low but sharp, incomplete (ending some distance behind the postscutellum). In all ♀ seen the apical margin of tergite 2 is only slightly depressed, but bears decidedly coarser punctures than the disk; in both ♂ seen this apical area is somewhat channelled and the sculpture is very coarse, more or less aciculate (the channel is deeper in the Huachuca ♂). The antennal hook of the ♂ is straight and shaped as in most other species of the genus. The clypeus differs little in both sexes, the apical margin being a trifle more curved inward in the ♂.

Color Pattern and Variation.—The color pattern is unusual among North American *Ancistrocerus,* the yellow markings having a brownish or orange hue, mainly caused it would seem by the short silky pubescence. In the ♀ the markings are: a spot before apex of clypeus;[12] a dot above antennae and one between each antenna and eye; a spot on upper outer orbit; humeral margin of pronotum; outer margin of tegula; broad apical margins of tergites and sternites 2 to 5; spots on tergite and sternite 6; sometimes a narrow line along apex of tergite 1; a streak on fore tibia; and a spot on last segment of fore tarsus. Under side of flagellum more or less ferruginous. Wings more or less fuliginous, often somewhat yellowish or orange anteriorly. The ♂ is similar, but lacks spots on frons and tegula; the humeral margin is barely yellow in the middle and the clypeus is yellow, except for black margins.

A. parredesi is homeochromic with *Pachodynerus nasidens* (Latreille), as noted by de Saussure, and with several other Aculeate Hymenoptera, some of which occur also in southern Arizona. (See J. Bequaert, Entom. Americana, N. S., XIII, p. 110, 1933.)

The Huachuca and Oaxaca ♂ were sent to me for study by Dr. R. M. Bohart. Zavattari saw ♀ from Mexico (Arch. f. Naturgesch., LXXVIII, Abt. A, Heft 4, p. 178, 1912). The ♂ from Oaxaca, at the Cal.A.S., is herewith designated as the allotype.

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[12] The spot on the clypeus is said to be "toward the base" in the English description of de Saussure's 1875 paper; but it is correctly described in the Latin diagnosis: "clypeo infere ferrugineo-maculato."